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A. Ramsay Pinx.

R. Houston Sculp.

RICHARDUS MEAD. M.D.

THE
MEDICAL
WORKS
OF
RICHARD MEAD, M. D.

PHYSICIAN to his late Majesty King GEORGE II.
FELLOW of the ROYAL COLLEGES of PHYSICIANS
at LONDON and EDINBURGH, and of
the ROYAL SOCIETY.



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M.DCC.LXII.



M E M O I R S

OF THE

L I F E and W R I T I N G S

OF THE

A U T H O R.

DR. Richard Mead was descended from a considerable family in Buckinghamshire, and born at Stepney, a small village near London, in August 1673. His father, Mr. Matthew Mead, was a celebrated divine among the nonconformists, and had been one of the two ministers of that parish; but was ejected in 1662. He had a very numerous family; yet having a handsome fortune, he educated his children liberally, and kept a private tutor in his house for that purpose.

Party rage running high at the end of Charles II.'s reign, Mr. Mead became obnoxious, and was forced to withdraw himself. He went into Holland, after having placed his son Richard at a school, under Mr. Singleton, an able master of his own principles. Here he made a great progress in every thing, which belonged to the Belles Lettres; and, in the year 1689, was sent to
a 2 Utrecht,

Utrecht, to complete those studies under the illustrious Grævius, to whom he was recommended by his eldest brother, who had also been his pupil.

After three years residence at Utrecht, he went to Leyden; and being determined to dedicate himself to the study of physick, he attended Herman's botanical courses, and Pitcairn's lectures on the theory and practice of physick. Pitcairn was very reserved out of college; nevertheless, our young student insinuated himself so far into the good graces of this professor, that he drew from him several observations, of which he afterwards made good use in his writings, but never without acknowledging to whom he was indebted for them.

His academical studies being finished, he set out upon his travels to Italy, in company with his eldest brother Mr. Samuel Mead, David Polhill, Esq; and Dr. Thomas Pellet, afterwards president of the college of physicians at London. In Italy he met with every thing which could gratify and improve his exact and refined taste, for all that is great and beautiful: and how advantageously to himself, as well as usefully to the publick, he employed himself there, his works bear ample testimony.

At Florence he had the curiosity to enquire for the Tabula Isiaca: but getting no information about it, he desired leave to search for it in a lumber room over the gallery, where he found this valuable piece of antiquity, buried in dust and rubbish. He did the same service to the Florentines upon this occasion, as Tully formerly

formerly did the Syracusians, when he discovered to them the tomb of Archimedes^a. At Padua he took the degree of doctor of philosophy and physick, in August 1695; and spent some time afterwards at Naples and Rome. On his return home in 1696, he settled in the place of his birth; where he practised physick for some years with a success and superiority of skill, which established his reputation, and laid the foundation of his future greatness.

In 1702, he published *A Mechanical Account of Poisons*, which work was so well received, that an abstract of it was inserted in the *Philosophical Transactions*^b for January and February 1703. It was reprinted in 1708, with some additions; but as it stands in this collection, it is taken from the edition of 1747, which differed so much from any of the former, that it might almost be looked upon as a new performance. In his younger days he imagined, that he was able to account mechanically for the effects of several poisons, by their mixture with the blood; but he was afterwards convinced, that there is in all living creatures a vehicle infinitely more subtil, an ethereal and invisible liquor, over which poisons have a real, though inexplicable, power^c. This retracting of an opinion, early espoused, and which procured him great credit in the literary world, shews a candour and ingenuity becoming a great man.

In 1704, appeared his treatise *De Imperio Solis ac Lunæ in Corpora Humana, & Morbis inde oriundis*.

His

^a Tusc. Quæst. v. 3.

^b N° 283.

^c See the Preface.

His reasonings upon this abstruse subject are grounded upon the principles of planetary attraction, lately discovered by Sir Isaac Newton; and, as the system of that illustrious philosopher was then but little known, so it is easy to conceive, that our author's performance would be rather admired, than understood, by the generality of readers. He republished it in 1748, with alterations and additions.

Dr. Mead, in his travels through Italy, met with Bonomo's letter to Redi, setting forth his discoveries with relation to the cutaneous worms, that generate the itch. He presented an analysis of it to the Royal Society; which, together with his Account of Poisons, deservedly procured him a place in that very useful body. This analysis was inserted in the Philosophical Transactions^d of the first months of the year 1703. This same year he was chosen physician to St. Thomas's hospital; and about the same time was appointed, by the Surgeons company, to read the anatomical lectures in their hall.

In 1707, his Paduan diploma for doctor of physick was confirmed by the university of Oxford. In 1716, he was admitted fellow of the College of Physicians; and went through all the offices of that learned body, except the presidentship, which he declined in the year 1744. Though nothing could be greater than our physician's merit, yet it might not have been thus universally known so soon, if it had not been for the famous Dr. Ratcliffe. Ratcliffe took a particular pleasure

^d Artic. II.

sure in patronizing a young man of Mead's excellent and amiable endowments: and in 1714, when the former died, the latter succeeded him in his house, and in the greater part of his business. He had quitted Stepney some years before this, and had resided in Crutched and then in Austin-fryars, for the sake of being near St. Thomas's hospital. The distance of his new habitation from thence, for Ratcliffe lived in Bloomsbury-square, induced him to resign his place of physician; upon which occasion he received the unanimous thanks of the grand committee for his services, and was presented with a governor's staff.

Dr. Mead was now at the head of his order, as we learn from the testimony of writers, who cannot be supposed to have flattered. The celebrated Dr. Jurin addressed to him A Dissertation concerning the Force of the Heart, written against what the no less celebrated Dr. James Keill had advanced upon that subject: and he begins it in the following remarkable manner. " Sir: Though I am not ignorant how rude
 " and imperfect this dissertation is, yet I readily ven-
 " ture to submit it to your penetrating judgement.
 " For how could I wish for a more impartial judge,
 " or how could I choose a more proper umpire, than
 " him, whose remarkable candour and humanity are
 " as well known to us all, as those excellent talents
 " which he enjoys, adorned with every kind of learn-
 " ing; and by whose bright genius and fine judge-
 " ment we see the theory of medicine enlightened
 " and illustrated, and the practice of it strengthened
 " and

“ and made easy? Nor is there any one living, of
 “ whose approbation I should be more desirous, or
 “ under whose authority this discourse, if it has the
 “ good fortune not to displease you, will be more safe
 “ from the cavils of some perverse people^e.” Dr. Keill
 also addressed his Answer to the foregoing Dissertation
 to Dr. Mead: “ For, says he to him, as my adversary
 “ has besought you to be his patron, so I desire to
 “ leave this controversy to your determination, who
 “ are a fit and learned judge of it. And for your
 “ part, great Sir, who hold the first rank in physick,
 “ be pleased so to moderate by your prudence the dis-
 “ putations of those who differ in opinion, that they
 “ may not be contemptible to the unlearned, but pro-
 “ fitable to the learned^f.” These papers were written
 at first in Latin, printed in the Philosophical Trans-
 actions, and dated, the former January, the latter
 June, 1719: from which it appears, that Dr. Mead
 was applied to by the ablest men, as a fit moderator
 and judge in the most difficult questions, altho’ he
 was not much beyond that period of life, when the
 generality of his profession begin to emerge.

It is remarkable, that party-principles never influ-
 enced this great man’s attachments: and tho’ he was
 himself a very hearty whig, yet he was upon terms of
 the strictest intimacy with Garth, Arbuthnot, and
 Freind. And when the last, upon a suspicion of be-
 ing concerned against the government with bishop
 Atterbury,

^e Keill’s Essays on several Parts of the Animal Œconomy, p. 54
 Lond. 1738. ^f Ibid. p. 79, 84.

Atterbury, was committed a prisoner to the Tower in 1723, Dr. Mead constantly visited him, and became one of his sureties to procure his enlargement. But what contributed to cement the friendship between Freind and Mead, was a common quarrel they had been engaged in some years before. Dr. Mead having had frequent opportunities of experiencing the efficacy of purgatives to prevent, or at least to lessen, the secondary fever, which so often proves fatal in the confluent small-pox, communicated this method of practice to several of his brethren, particularly to Ratcliffe and Freind. Freind adopted it; and, in his Commentary on the first and third books of Hippocrates's Epidemics, published in 1717, inserted the letter which Mead had written to him upon that subject some years before. These two gentlemen being now considered as associates in the same cause, a party was immediately formed against the new practice and its favourers; at the head of which was Dr. John Woodward, physick professor at Gresham college, who published upon this occasion, *The State of Physick and Diseases, with an Enquiry into the Causes of the late Increase of them, but more particularly of the Small-pox.* In this performance Dr. Woodward was not content with condemning the practice, but treated its favourers with contempt and ill manners, and more particularly our author; whose resentment, tho' just and well grounded, appears nevertheless to have been carried to a very exceptionable length, seeing it had not subsided twenty years after the death of his antagonist^s.

b

In

^s Preface to his Treatise on the Small-pox and Measles.

In 1719, when the plague was so fatal at Marseilles, the lords of the regency directed Mr. secretary Craggs to apply to Dr. Mead, as a man the best qualified to find out the most effectual methods to prevent its spreading. This occasioned the publication of his *Short Discourse concerning Pestilential Contagion, and the Methods to be used to prevent it*, in 1720; which was so greedily received, that no less than seven editions were printed in one year. The eighth, which appeared in 1723, was enlarged with many new observations, and a whole chapter on the method of cure; and the last, in 1744, was not without improvements.

In 1723, Dr. Mead pronounced the *Oratio Harveiana* before the College of Physicians, which was published in 1724; and to it was annexed, *Dissertatio de nummis quibusdam a Smyrnæis in medicorum honorem percussis*. This oration was attacked with some smartness, by the most ingenious and learned Dr. Conyers Middleton, in a piece intitled, *De medicorum apud veteres Romanos degentium conditione dissertatio, in qua contra viros celeberrimos Jacobum Sponium & Richardum Meadium servilem atque ignobilem eam fuisse ostenditur*^h. Mead's side of the question was defended by Dr. John Ward, late professor of rhetoric in Gresham College; whom Dr. Middleton, in a reply, treated with much contempt. Nevertheless, he every where expresses the greatest regard for Dr. Mead; and, in a work published several years after, mentions him in the most honourable manner.

^h Middleton's Works, vol. iv.

manner. He is speaking of an antique picture, which he supposes to be the first, and the only one of the sort ever brought to England; “*Donce Meadius noster,*
 “*says he, artis medicæ decus, qui vitæ revera nobilis,*
 “*vel principibus in republica viris, exemplum præbet,*
 “*pro eo, quo omnibus fere præstat, artium veterum*
 “*amore, alias postea quædam & splendidiores, opi-*
 “*nor, Roma quoque deportandas curavitⁱ.*”

In 1727, soon after his late Majesty's accession to the throne, he was appointed one of the royal physicians; and for many years was engaged in the constant hurry of an extensive and successful practice. When, through age, he was grown unequal to the discharge of more active functions, and retirement was become absolutely necessary, he took the opportunity to revise his former writings. Some have already been mentioned, which were republished in this season of his life; and in 1747, came out his discourse, *De Variolis & Morbillis*, to which was annexed a treatise on the same diseases, by the celebrated Arabian physician Abubeker Rhazes, faithfully translated from the original Arabick into Latin. A copy of the only remaining Arabick manuscript of Rhazes's treatise was communicated from Leyden by the celebrated Boerhaave; between whom and our author there always subsisted a very friendly correspondence. In his discourse upon the Small-pox, there is a chapter upon Inoculation; from which it appears, that he was greatly concerned in introducing and establishing this laudable practice among us.

ⁱ *Germana quædam antiquitatis eruditæ monumenta*, p. 2. Works, vol. iv.

The year 1749 furnished out two new productions from our author; namely, *Medica sacra, five de morbis insignioribus qui in Bibliis memorantur commentarius*; and *A discourse on the Scurvy*, annexed to Mr. Sutton's second edition of his *Method for extracting the Foul Air out of Ships*. The last, and, as some think, the most useful of all his works, is his *Monita & Præcepta medica*, published in 1751. Here, with great candour and simplicity, he communicates all the discoveries that long practice and experience had opened to him, concerning diseases and their cures; and concludes with many salutary directions for preserving the body and mind, perfect and entire, to a good old age. Though his faculties do not seem to have been at all impaired in this last work, yet he did not find himself in a condition to finish any thing further; but gently decaying, and growing weaker every day, he expired upon the 16th of February 1754, without visible signs of pain, and was buried on the 23d in the Temple church, near his brother Samuel Mead, an eminent counsellor at law, who died twenty years before.

Dr. Mead was twice married. By his first wife, Ruth, the daughter of Mr. John Marsh, merchant of London, whom he married in 1699, and who died in 1719, he had eight children; four of whom died in their infancy. Of the rest, the second daughter, now deceased, was married to the late Charles Bertie, of Uttington in Lincolnshire, Esq; the eldest to Dr. (now Sir) Edward Wilmot, and the youngest to Dr. Francis Nichols, both physicians in ordinary to his Majesty.

Majesty. His only son, Richard Mead, is married to Anne, the daughter of William Gore, Esq; of Tring in Hertfordshire. The doctor's second wife, who is still living, was Anne, daughter of Sir Rowland Allston, Bart. of Odell in Bedfordshire, whom he married in August 1724, but had no issue by her.

To attempt a formal elege of this great man, would be impertinent in a preface to his works; and especially after what has been occasionally dropped in the course of these Memoirs. There is however one circumstance relating to him which deserves to be mentioned, because it is uncommon; which is, that by his singular humanity and goodness, he conquered even envy itself: and accordingly this compliment was justly paid him in a dedication, by the editor of Lord Bacon's Works, in the year 1730.

It would be impertinent, in like manner, because it would be tedious, to enumerate the great and various services he did to the republick of letters: let it suffice to observe, what indeed every body knows, that few princes have shewn themselves equally generous and liberal, in promoting science, and encouraging learned men: and this is the true reason why Dr. Mead, notwithstanding the immense gains arising from his profession, did not die so rich, as might have been expected.

As to his literary collections and other curiosities, the world has already been acquainted with their value and contents by printed catalogues; and it may perhaps be said, not unjustly, that no subject in Europe had a library and a cabinet so richly and so judiciously

ciously furnished. Nor did he make this great collection merely for his own use, but freely opened it to others; so that ingenious men were sure of finding at Dr. Mead's the very best helps in all their undertakings.

He maintained a constant correspondence with all the literati in Europe; and his reputation as a scholar, as well as a physician, was universally established. There cannot be a better proof of this, than the king of Naples sending him the two first volumes of Signior Bajardi's of the Antiquities found in Herculaneum; with the additional compliment of asking in return, only, a complete collection of his own works. This prince at the same time invited him to his palace, that he might have an opportunity of shewing him all those valuable monuments of antiquity; and Dr. Mead used to declare to his friends, that his years alone restrained him from undertaking a journey so suited to his taste and inclination.

Upon the whole, no foreigner of any learning, taste, or even curiosity, ever came to England, without being introduced to Dr. Mead, as it would have been a matter of reproach to have returned without seeing him. On these occasions, his table was always open; where, what seldom happens, was united the magnificence of princes with the pleasures of philosophers.

To conclude: He was sincerely the friend of all ingenious and learned men, at home and abroad: of Pope, of Halley, of Newton, with whose portraits his house was furnished. He presented to the college of Physicians a marble busto of Harvey, done by an
excellent

WRITINGS OF THE AUTHOR. xv

excellent hand, from an original picture in his possession; to which his own has been added by Dr. Askew, done by Roubilliac, and placed near Dr. Harvey.

His son has likewise caused a handsome monument to be erected to his memory in Westminster-abbey, with the following inscription by Dr. Ward, of Gresham-college:

M. S.

V. A. RICHARDI MEAD ARCHIATRI
 ANTIQVA APVD BVCKINGENSES FAMILIA NATI
 QVI FAMAM HAVD VVLGAREM MEDICINAM FACIENDO
 IN PRIMA IVVENTVTE ADEPTVS
 TANTA NOMINIS CELEBRITATE POSTEA INCLARVIT
 VT MEDICORVM HVIVS SAECVLI PRINCEPS HABERETVR
 IN AEGRIS CVRANDIS LENIS ERAT AC MISERICORS
 ET AD PAVPERES GRATVITO IVVANDOS SEMPER PARATVS
 INTER ASSIDVAS AVTEM ARTIS SALVTARIS OCCVPATIONES
 OPERIBVS NON PAVCIS DOCTE ET ELEGANTER CONSCRIPTIS
 QVAE INGENIO PERSPICACI ET VSV DIVTVRNO NOTAVERAT
 IN GENERIS HVMANI COMMODAM VVLGAVIT
 LITERARVM QVOQVE ET LITERATORVM PATRONVS SINGVLARIS
 BIBLIOTHECAM LECTISSIMAM OPTIMIS ET RARISSIMIS LIBRIS
 VETERVMQVE ARTIVM MONVMENTIS REFERTAM COMPARAVIT
 VBI ERVDITORVM COLLOQVIIS LABORES LEVABAT DIVRNO
 ANIMO ITAQVE EXCELSO PRAEDITVS ET MORIBVS HVMANIS
 ORBISQVE LITERATI LAVDIBVS VNDIQVE CVMVLATVS
 MAGNO SPLENDORE ET DIGNITATE VITA PERACTA
 ANNORVM TANDEM AC FAMAE SATVR PLACIDE OBIT
 XIII KALENDAS MARTIAS A. D. MDCCLIV AETATIS SVAE LXXXI
 ARTIVM HVMANIORVM DAMNO HAVD FACILE REPARABILI
 QVIBVS IPSE TANTVM FVERAT DECVS ET PRAESIDIVM
 BIS MATRIMONIO IVNCTVS
 EX PRIORI DECEM SVSCEPIT LIBEROS
 QVORVM TRES TANTVM SVPERSTITES SIBI RELIQVIT
 DVAS FILIAS VIRIS ARCHIATRORVM HONORE ORNATIS NVPTAS
 ET VNVM SVI IPSIVS NOMINIS FILIVM
 QVI PIETATIS CAUSA PATRI OPTIME DE SE MERITO
 MONVMENTVM HOC PONI CVRAVIT

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A MECHANICAL
ACCOUNT
OF *TB*
POISONS,
IN SEVERAL
ESSAYS.

ПРЕДЪЛЪКЪ

ТЪНЪОДЪ

ЗЪНЪОДЪ

ЗЪНЪОДЪ

A D V E R T I S E M E N T.

THIS Book was first published in the year 1702, and reprinted with very few additions, in 1708. I then really intended never more to trouble myself about it: but the demand for it having for many years been so great, as to tempt some booksellers to print it twice or thrice, very incorrectly, in a piratical way (as they call it) without my knowledge; I have thought it right, both in justice to the public and myself, to give a new edition of it.

It will easily be believed, that after more than forty years (spent neither without study nor experience) I cannot be fond of a little performance in physick, written at a time of life, in which the facts must, for the most part, be taken from other authors, and the reasonings upon them would often require more patient thinking, and a riper judgment. And therefore I make no doubt but the public always made great allowances upon this account, when they gave the book so favourable a reception.

In return to this kind usage, I have now taken some pains to re-consider my subject. Besides many other improvements, I have often from my theory drawn ob-

servations, useful, as I imagine, in practice. Neither have I been ashamed, on some occasions, (as the Latins said) *cædere vineta mea*, to retrench or alter whatever I have judged to be wrong. *Dies diem docet*. I think truth never comes so well recommended, as from one who owns his error: and it is allowed that our first master, Hippocrates, never shewed more wisdom and greatness of mind, than in confessing his mistake, in taking a fracture of the skull for the natural future^a; and the compliment, which Celsus^b makes to him on this occasion, is very remarkable and just: *More scilicet, inquit, magnorum virorum, et fiduciam magnarum rerum habentium. Nam levia ingenia, quia nihil habent, nihil sibi detrahunt: magno ingenio, multaque nihilominus habituro, convenit etiam simplex veri erroris confessio; præcipueque in eo ministerio, quod utilitatis causa posteris traditur.*

I might however urge in my excuse, that as the notions I have retracted, regard chiefly the nervous fluid, and its properties; so my new reasonings are founded upon experiments of electricity and attraction, applied to this fluid, which at the time of my writing were not known. The instructive Queries and Suppositions of Sir Isaac Newton, and the surprising electrical operations of Mr. Stephen Gray^c, improved by monsieur Du Fay, at Paris^d, had not then inlightened the learned world.

^a Epidem. lib. v. §. 14.

^b Medicin. lib. viii. c. 4.

^c Vid.

Phil. Transf.

^d Vid. Memoires de l'Academie, 1733, 1734, 1737.

But there are here two additions, which I ought particularly to mention: the first is the Introduction. Having observed, that the actions of poisons, though they are of very different kinds, is generally uniform; and also, that the animal spirits are first affected by it; I have thought it proper, as this opinion may seem somewhat strange and singular, to premise an inquiry into the nature of the nervous fluid, of which it must be owned that we know too little. And if, in a matter so abstruse and difficult, what I have advanced has more in it of conjecture than of demonstration, it may be allowed to be something.

Quadam prodire tenus, si non datur ultra.

Whoever will pass a judgment upon such nice speculations, must take the whole scheme together. Truth is always a connected scheme; and inferences justly drawn not only illustrate, but confirm one another.

The other addition is, “ An anatomical description of those parts in a Viper, and in a Rattle-Snake, which are concerned in their poison,” by our great anatomist the learned and ingenious Dr. Nicholls. He having taken notice, that the Anatomical Observations on the Viper, by Dr. Areskine, in the first edition, were neither complete, nor in every point true, has been pleased to give a new anatomy of the whole head, not only of the common Viper, but also of that larger kind of it, the Rattle-Snake: that so those parts, which can-

not so easily be seen in the smaller, may more distinctly appear in the bigger animal. How accurately he has performed this task, and how thoroughly he has explained the mechanism and offices of the several organs, any one may judge, who will compare his descriptions with the best of those, which have been hitherto made by other anatomists.

T H E
P R E F A C E
T O T H E
F I R S T E D I T I O N.

TO give an exact and particular account of the nature and manner of the action of Poison, is no easy matter ; but to discourse more intelligibly of them, than authors have hitherto done, not very difficult. One may without much pains shew their effects to be owing to something more than the bare qualities of heat or cold ; and discover the footsteps of mechanism in those surprising phænomena, which are commonly ascribed to some occult or unknown principle. But to unravel the springs of the several motions, upon which such appearances depend, and trace up all the symptoms to their first causes, requires some art as well as labour : and that both upon the account of the exquisite fineness, and marvellous composition, of the animal machine in which they are transacted, and of the minuteness of those bodies, which have the force to induce in it such sudden and violent alterations.

I have attempted somewhat this way in the following Essays ; in which I do not promise methodical and finished treatises, but only some short hints of natural history, and rude strokes of reasoning ; which, if put together and rightly improved, may perhaps serve to furnish out a more tolerable Specimen of the Doctrine of Poisons, than has yet been published.

The first draught of this small piece I made some years since, entertaining myself at leisure hours with experiments on Vipers, and other venomous creatures ; examining now and then the texture of Arsenic, Mercury Sublimate, and the like malignant substances ; turning over what authors had said on the several subjects, and making such remarks as from time to time occurred.

These continued inquiries made up at last three or four short discourses ; which when I began to digest into order, the increase of business contracted the intervals of my spare time : and the diversion of such studies quickly giving way to the severity of more necessary labours, they were quite thrown by. Till talking not long since with Dr. Areskine concerning the Viper, I took occasion to review my scattered papers, and confirm my reasonings by new experiments. He very readily offered me his Anatomical Observations These I have put at the end of the first Essay : which do not promise a complete dissection of the animal, but chiefly shew the make of those parts, which are concerned in the poison.

My design, in thinking of these matters, was, to try how far I could carry mechanical considerations in accounting for those surprising changes, which Poisons make in an animal body; concluding (as I think, fairly) that if so abstruse phænomena as these come under the known laws of motion, it might very well be taken for granted, that the more obvious appearances in the same fabric are owing to such causes, as are within the reach of geometrical reasoning: and that therefore as the first step towards the removal of a disease is to know its origin; so he is likely to be the best physician, who, having the same assistance of observations and histories with others, best understands the human œconomy, the texture of the parts, motions of the fluids, and the power which other bodies have to make alterations in any of these.

Nor indeed ought any one to doubt of this, who considers that the animal compages is not an irregular mass, and disorderly jumble of atoms, but the contrivance of infinite wisdom, and the master-piece of that creating power, who has been pleased to do all things by established laws and rules, and that harmony and proportion should be the beauty of all his works.

It were therefore heartily to be wished, that those gentlemen, who are so much afraid of introducing mathematical studies, that is, demonstration and truth, into the practice of physick, were so far at least instructed in the necessary disciplines, as to be able to pass a true judgment, what progress and advances may be made this way. They would not then perhaps decry

an attempt of so much moment to the welfare of mankind, as vain and impossible ; because it is difficult, and requires application and pains.

It is very evident, that all other methods of improving medicine have been found ineffectual, by the stand it was at for above two thousand years: and that since of late mathematicians have set themselves to the study of it, men already begin to talk so intelligibly and comprehensibly, even about abstruse matters, that it may be hoped in a short time, if those, who are designed for this profession, are early, while their minds and bodies are patient of labour and toil, initiated in the knowledge of numbers and geometry, that mathematical learning will be the distinguishing mark of a physician from a quack ; and that he, who wants this necessary qualification, will be as ridiculous as one without Greek or Latin.

I have, as to what regards the animal œconomy, referred as much as I could to the works of Bellini, which have brought great light into the dark regions of physic, and taught us to argue clearly and consistently, instead of amusing ourselves with unintelligible words or precarious hypotheses. The Dissertations of Dr. Pitcairne, the honour of his profession in Scotland, are a convincing proof of the advantage of such a mechanical way of reasoning : nor could malice itself deny this, were not ignorance in confederacy with it, which will secure any one from being benefited by the most useful demonstrations.

Notwithstanding this I have been forced now and then to make digressions from my subject, to clear some doctrines necessary to be known, which have not been explained by others. For indeed the data, from which we argue in these matters, are by many too few. Dr. Cheyne, the author of the New Theory of Fevers, has enumerated several particulars, in which the theoric part of Medicine still wants improvement. If these deficiencies were made good, we might with more ease proceed in our inquiries into human nature; and should soon convince the world, that the most useful of arts, if duly cultivated, is more than mere conjecture, or base empiricism.

As to the authors I have made use of, who have treated of Poisons, I have quoted only those, who furnished me with matter of fact: for there are but few originals; and very large volumes on this subject many times contain little more than a collection of vulgar errors.

I had once thought to have carried these searches farther; in particular, besides what is occasionally mentioned in the last Essay concerning infection in acute diseases, to have inquired into the nature of contagious and hereditary distempers. But the humour of scribbling would not hold out; and some perhaps will say, 'tis well enough it did not: for I am not ignorant, how few I am like to please. If it be hard to think and write justly, 'tis harder yet to bring others to one's own taste; nor shall I be at all angry, if to many I have afforded matter of satyr and invective: less wit

suffices for these, than for the discovery of useful truths. They, who have no smattering of mathematical knowledge, are incompetent judges of what service I have done towards the improvement of the theory, or practice of medicine: and those, who are acquainted with these matters, will, it may be, think it something to talk intelligibly on such difficult and abstruse points. I neither want applause, nor fear censure: and therefore be the fate of these papers what it will, as they were first penned for my own satisfaction, and innocent entertainment; so I am resolved they shall never engage me in the trouble of quarrels or disputes.

London, 1702.

C O N-

C O N T E N T S.

I N T R O D U C T I O N.

E S S A Y I.

Of the Viper.

An Appendix, containing anatomical observations on the Viper and Rattle-Snake, and an account of some other venomous animals.

E S S A Y II.

Of the Tarantula.

E S S A Y III.

Of the Mad Dog.

E S S A Y IV.

Of poisonous Minerals, and Plants.

E S S A Y

E S S A Y V.

Of Opium.

An Appendix, of Laurel-Water.

E S S A Y VI.

*Of venomous exhalations from the Earth, poisonous Airs
and Waters.*

INTRO-

INTRODUCTION.

THOSE things, which are experienced to be in their whole nature, or in their most remarkable properties, so contrary to the animal life, as in a small quantity to prove destructive to it, are called Poisons: whether they are hurtful by being taken inwardly at the mouth, or communicated to the body externally by a wound.

This subject has afforded matter for great disputes among philosophers, in their inquiries into the frame of the world. Some have made it an objection to the goodness of the Creator, that there should be any such productions as Poisons in nature: on the other hand, Paracelsus, Van Helmont, and their followers, fond of magnifying their chemical art, tell us, that Poisons are really designed for other purposes than is commonly thought; they being indeed great medicines, when their concealed useful qualities are, by our study and labour, discovered and brought out of them (*a*). To prove this, they alledge that remarkable saying of the wise man (*b*): “ God made not death, neither

(*a*) Vid. J. B. Van Helmont opera, pag. 373.
of Solomon, chap. i. ver. 13.

(*b*) Wisdom

“ hath

“ hath he pleasure in the destruction of the living.
 “ For he created all things, that they might have their
 “ being ; and the generations of the world were
 “ healthful : and there is no Poison of destruction in
 “ them, nor the kingdom of death upon the earth.”

As the knowledge of those minute philosophers, who find faults in the disposition of the universe, is generally too superficial ; so I doubt the reasoning against them of our adepts, whose sight is often dazzled by the light of their furnaces, will, in the present affair, appear too deep, and far-fetched. For it does not look like universal beneficence, to create substances, whose manifest and obvious qualities are noxious and destructive, though they may have other virtues which are salutary, but which are only to be extricated from them by deep searches of art, and the torture of the fire.

The true state of the case seems to be this. The productions of nature of this kind, as to us, are often medicinal, either in the external or internal use of them ; and experience, improved by reasoning, teaches us to prepare and apply them to various purposes : but they are also not only physic, but even food to some other animals, which, by natural instinct, devour them ; and these themselves afford not only good nourishment, but sometimes remedies to us. Little insects, which we think troublesome, are necessary to the life of wholesome birds and other creatures. Goats and quails are fattened by hellebore (*c*), starlings by hem-

(*c*) Lucret. lib. iv. 645.

lock ^d, and hogs innocently eat henbane ^e; all which we call poisonous. Many instances might be given of the like kind. Will any one say that the venom of the Viper is not made for our good, when without it (as will be observed in the following discourse) this reptile could not have been provided with those noble qualities, which render it effectual against some very stubborn diseases?

But this question may perhaps seem more difficult with regard to poisonous minerals: as, for instance, arsenic, which we find to be diffused almost through the whole mineral kingdom. Now it must be observed, that this is not a perfect mineral, but an active substance made use of by nature in preparing several metals in the earth, which are of great service to mankind. It particularly appears to be so in the growth of silver, copper, tin and lead; the ores of all which contain, besides common sulphur, a great deal of arsenic: so that this, in the language of the chemists, may be called a mineralising principle. And the case will be found to be much the same in all natural productions of this kind.

In short, there is in the fabric of the world a great chain and dependency of things upon one another: and though our knowledge does not reach to every particular link of it, yet the farther we advance in the study of nature, the more we shall find that

^d Galen. Simpl. Medic. Fac. lib. iii. c. 18.
^e Hippoc. Hypoth. Emp. i.

^e Sext. Em-

Whatever is, is right ^f.

But how much more would it appear to be so, could we look into the whole system of the universe, and see the relation which our world perhaps bears to some of those innumerable others in the Immense Space, which the Almighty Being may probably have made dependent upon one another by established laws and order !

As to the text cited out of Solomon, the meaning of it is plainly this. “ God created nothing to be destructive to mankind, but gave to all things their proper nature ; and the productions of the world are wholesome. Even poisons were not designed to be hurtful, but for good uses : for in all the earth there are provisions made against death.”

Before we proceed to particulars, it may not be improper to give a general idea of Poisons, to explain in what manner they act, and by what alterations made in our bodies they become so hurtful.

Now as to this, it will appear from the following discourses, that though Poisons are of different kinds, as well those which kill by wounds, as those which are taken inwardly ; yet there is a great agreement in the manner of producing their effects : and that even internal Poisons exert their force in a manner analogous to the external.

^f Pope's Essay on Man, Epist. i.

Venomous animals, when they bite or sting, inflict a wound, and instil into it a drop or more of liquor, which infects the fluid of the nerves, and by this means inflames the membranes : hereupon a swelling arises, sometimes to a degree of mortification, which spreads to the neighbouring parts.

Poisonous substances, being swallowed, wound the nervous coat of the stomach. An inflammation ensues, which, according as the Poison is of a greater or lesser power, is communicated to the contiguous coats ; and in some cases, especially if it be of a mineral nature, ends in a perfect gangrene. For the difference between mineral and vegetable Poisons lies chiefly in this, that the former are of greater force than the latter.

But in all accidents of this kind, whether the wound be outward or inward, the mischief does not stop at the part affected, but it is carried farther, even through the whole body.

This is done by the great activity of the nervous fluid, one part of which being infected immediately taints all the rest : and thus the whole system of nervous expansions is drawn into spasms and convulsions ; which, according to the different offices of the parts to which the nerves belong, produce different symptoms. In the stomach and intestines, these spasms cause sickness, vomitings and gripes ; in the brain, deliria, sleepiness and epileptic fits ; in the heart, intermissions of the arterial pulse, palpitations and swoonings ; in the lungs, difficulty of breathing, with strangling and suffocations ;

locations ; in the liver, by the spasmodic contraction of the biliary ducts, the bile is returned into the blood, and makes a jaundice ; in the kidneys, the same disposition of the urinary canals interrupts the secretion of urine, and makes it quite irregular. In short, the animal œconomy is all disturbed : and though different Poisons may shew their most remarkable effects in different parts, and these, according to the violence of the hurt, may appear in very different degrees ; yet the symptoms always make it plain, that the first bad impression is made upon the animal spirits.

I have in another place shewn, from the manner in which persons are seized in pestilential fevers, that is, with faintness, giddiness, palpitations of the heart, tremblings, &c. that the nervous fluid is likewise principally affected in these diseases ; contagion being indeed a real Poison &c.

It will therefore be proper to inquire into the nature of this liquor : for I think no regard ought to be had to the immechanical notions of those authors, who imagine that there is no such thing in an animal body ; and that muscular motion and sensation are performed only by the vibrations of the fibres of the nerves, without the intervention of any spirituous fluid.

They, who can satisfy themselves with such a scheme, seem to have very little attended to what is transacted within us, in the effects of sudden passions

* Vid. Discourse on the Plague.

of the mind ; in the instantaneous translations of diseases from one part to another, as particularly in the gouty humour ; and in the surprising changes, made sometimes in a moment, in the secretions of those liquors, upon which life depends.

But, to say no more, as the brain is manifestly a large gland, with a most exquisite apparatus for the separation of a liquor from the blood ; this must, like all other glands, have an excretory duct : now the nerves are evidently contrived for this purpose, and consequently must always contain a proper subtile juice.

To proceed therefore ; this fluid, so far as we can discover by its effects, is a thin volatile liquor, of great force and elasticity ; being indeed most probably a quantity of the universal elastic matter, incorporated with fine parts of the blood, separated in the brain, and lodged in the fibres of the nerves. This is the instrument of muscular motion and sensation, a great agent in secretions, and indeed in the whole business of the animal œconomy.

By the universal elastic matter I understand that subtile and active substance, diffused throughout the universe, which our great philosopher, Sir Isaac Newton, supposes to be the cause of the refraction and reflexion of the rays of light, and by the vibrations of which light communicates heat to bodies ; and which readily pervading all bodies, produces many of their actions upon one another.

I refer,

I refer, for the sentiments of this divine man, to his *Opticks*^b; but more especially to a most remarkable letter of his to the honourable Mr. Boyle, written many years sinceⁱ. Whoever thoroughly comprehends and considers what is delivered in these pieces, under the form of *Queries* and *Suppositions*, will be let into some knowledge of the secret springs of nature; and will then, I hope, be inclined to think, that I have not been wrong in endeavouring to introduce the same principles from the inanimate into the animated world.

It seems very reasonable, from that uniformity, which there is in the laws of nature, to conclude that the animal spirits are something of this kind: for there can be no greater presumption in favour of a scheme, than that it is simple, and of a piece with the known system of the universe.

Now, an active substance of this kind in the nerves, must necessarily be very susceptible of alterations from other bodies of extreme minuteness and great force: in like manner, as we see some chemical liquors, upon their first approach to each other, to fall into fermentations; the result of which is a compound mixture of a quite different nature, from what might have been expected from the single ingredients.

Thus the compound spirit of nitre put to oil of cloves will effervesce even to a flame: a fermentation being indeed no more than the attraction and repulsion

^b Qu. 23, 24.

ⁱ Published in the life of Mr. Boyle, prefixed to his works, pag. 70. which life is since printed by itself.

of the particles of different bodies, when they come together.

By reflecting upon the phænomena, which the experiments of late years made upon electricity ^k have discovered to the world, and viewing the attractions and repulsions of the finest particles of electrical substances, any one may easily form an idea of this animal fluid, and of the excessive force and velocity with which it acts.

It is very observable, that the communication of electricity is much greater through animal than through inanimate bodies : that is, the elastic fluid passing through these meets with a greater quantity of the same matter in them than in the other ; the solid animal fibres being more adapted to receive it. The experiment of the boy suspended on silk or hair lines ^l is equally surprising and instructive, demonstrating this elastic spirit, even to our sight and touch. And if the nerves, as Sir Isaac Newton supposes, are very small, but solid, pellucid and uniform capillamenta, wrapt up in bundles ; the glass tube rubbed by the hand, and its action with the elastic fluid, represent to us in some degree the nerves and the animal spirits lodged in them.

Perhaps the prosecution of such trials upon living creatures, may in time make us more acquainted with the laws and actions of this Impetuous Part, (as Hippocrates ^m calls it) in the animal machine.

^k Philos. Transact. N^o 366. 417. 422. 423. 426. 436. 439. 444.

^l Ibid. N^o 417.

^m Epidem. lib. vi. § 8. Τα ὀρμῶντα σώματα.

Ita res accendunt lumina rebus ⁿ.

It is sufficient to our present purpose, to have described the nervous fluid so far, as to shew it to be such a one as is indowed with great activity and force, and therefore capable of receiving various alterations from other bodies, especially such as consist likewise of very subtile and powerful particles: and all Poisons, we know, are of this kind.

I was of opinion, when I first wrote these Essays, that the effects of Poisons, especially those from venomous animals, might be accounted for by their affecting the blood only: but the consideration of the suddenness of their mischief, too quick to be brought about in the course of the circulation, (for the bite of a Rattle-snake killed a dog in less than a quarter of a minute ^o, together with the nature of the symptoms entirely nervous, induced me to change my sentiments. For if, as Dr. Keil has computed ^p, the velocity of the blood is more than five thousand times lesser at the fortieth branch from the great artery, than it is in this artery before any ramification is made from it; how is it possible that the brain, heart, &c. should feel so sudden a hurt, unless it were conveyed to them by a medium of much greater quickness? and this can be no other than the animal spirits.

ⁿ Lucret. lib. i. ver. 1110.

^o Philosoph. Transact. N^o 399.

^p Vid. Tent. Medico-Physic. 2.

Neither is it amiss to add, that the observations I have made, if improved, may also afford hints useful in the cure of many diseases. For, though some of those distempers, which we call nervous, as particularly paralytic weaknesses, may be accounted for by irregular motions and obstructions of the animal spirits only; yet many of them certainly must arise from ill affections of the spirituous fluid itself. It can, for instance, never be conceived that the surprising appearances in phrenitical, maniacal, and melancholy disorders, should be brought about without alterations, suitable to the different cases, made in that active liquor, by which the mind governs the body.

There are many other cases, judged extraordinary, and not easily to be explained, which depend almost solely on the animal spirits. I shall mention only one.

A surgeon of great merit and experience, in a very useful book, lately published ^q, has observed, that sometimes in gun-shot wounds, attended with a great laceration of the membranes, though things seem to go on well for some days; yet the patient is suddenly seized with convulsions in his face, which so fix the jaws that he cannot speak, though the senses are not impaired, and inevitably dies. It is, I think, very plain, that this dreadful symptom must be owing to the bad condition of the nervous liquor, which it is brought into by the tearing of the membranes, and

^q Ranby, on gun-shot wounds, p. 72.

which, notwithstanding the tolerable state of the blood, does, by its own disorder, produce fatal consequences.

And, as we see in the mentioned electrical experiments, how remarkably the subtle matter is altered in its motions and effects, even by the simple contact of other bodies ; it must certainly be allowed, that when the same comes to be incorporated with the finest part of the blood, it will, according to the condition in which this is, make a fluid, elastic indeed, but at different times in a different degree, and therefore variously affected by external agents.

But to return to Poisons : as the different state of the nervous fluid may in some measure alter their effects ; so likewise these themselves, though really of the same kind, may yet so differ in their force and degree of action, as to be hurtful in various and seemingly different ways.

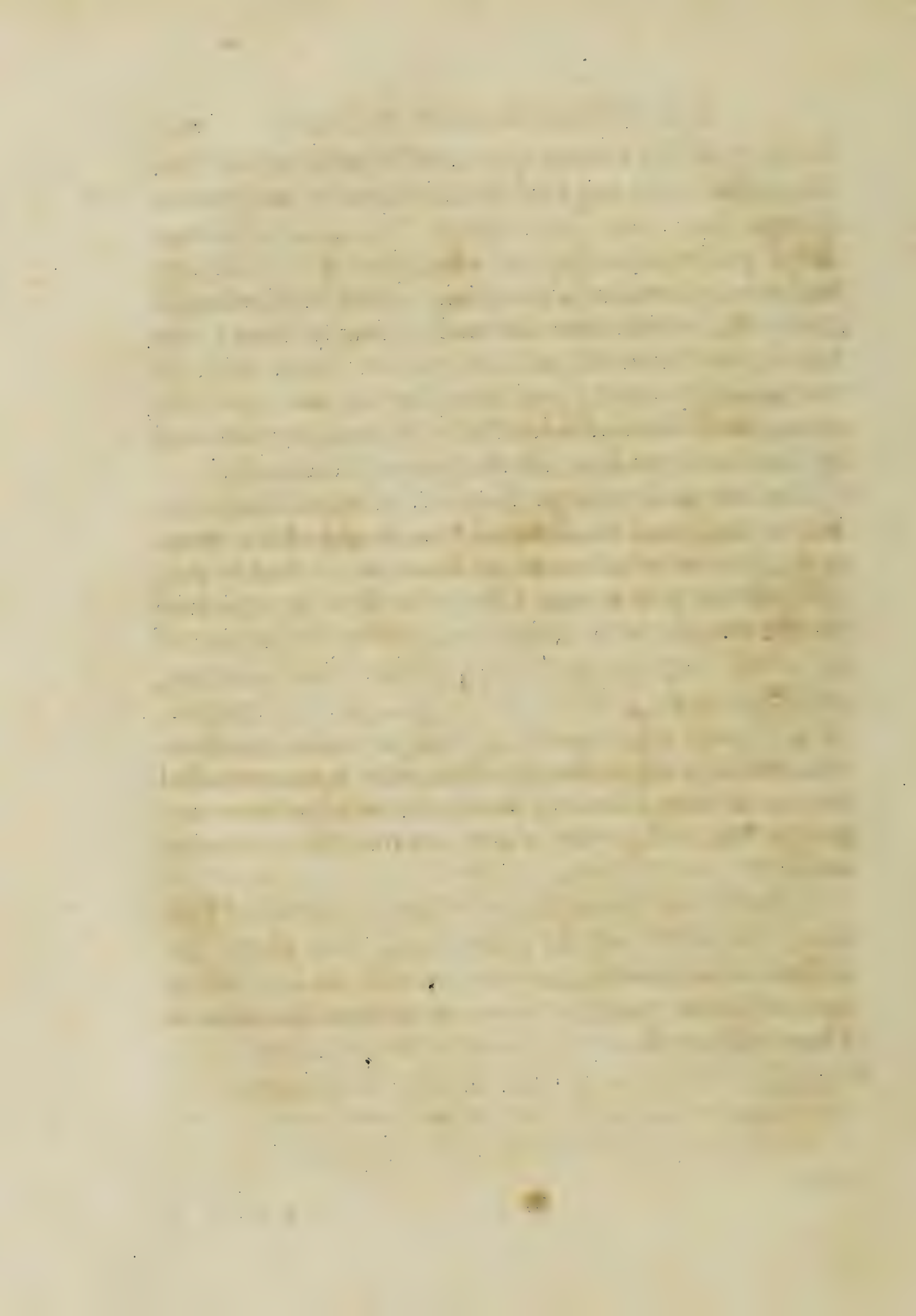
Upon this consideration, the surprising stories related by authors, of the different deaths inflicted by Serpents of different kinds, particularly in Africa, are not at all incredible. I very well remember, that the learned Paul Herman, many years ago professor of botany in the university of Leyden, who had lived a great while in India, affirmed, that there were also in several parts of that country venomous creatures, of the same kind with those described by the African historians, which killed by very different effects of their Poison : and that upon due inquiry into facts, he was convinced that the beautiful descriptions in

Lucan ^r of the various species of Vipers, which Cato met with in the hot Libyan deserts, were not poetical fictions, but taken from nature. He had in his museum, preserved in spirit of wine, several of these very Serpents; particularly, the Aspis, called Nintipolongha Zeylanica, whose bite induced a deadly sleep; the Dipfas, or Situla Macassarica, which killed with an unquenchable thirst; and the Hæmorrhous Macassaricus, the Poison of which was immediately followed by hæmorrhages from all the pores of the body.

For we must observe likewise, that although the first impression of the Poison be made upon the nervous spirit, yet the whole mass of blood very quickly partakes of the hurt: not, I suppose, from any mixture of the venom with it, but from such a corruption of it, as an irregular circulation, interrupted secretions, and stagnations in the smallest vessels, (the consequences of a vitiated nervous fluid) may naturally produce. Nor will this seem strange, since such a compounded liquor, as the blood is, may certainly undergo any imaginable changes by alterations made in its motion only.

Thus much concerning the general action of Poisons: the effects of the particular kinds of them, described in the following discourses, will (at least in my opinion) be so many proofs of the truth of the doctrine I have advanced.

^r Lib. ix.



E S S A Y I.

OF THE VIPER.

THE Viper has always been so remarkable for its venom, that the most remote antiquity made it an emblem of what is hurtful and destructive. Nay, so terrible was the nature of these creatures, that they were very commonly thought to be sent as executioners of divine vengeance upon mankind for enormous crimes, which had escaped the common course of justice. Thus Herodotus^a and Ælian^b do both take notice that Adders were sacred among those masters of learning and superstition the Egyptians: that they affirmed of one sort of them particularly, that they were made to be ministers of the will of the gods, by averting evil from good men, and punishing the bad. Therefore the goddess Isis was represented with an Asp upon her head^c, to denote both her wisdom and power. And from her the Greeks and Romans honoured Minerva with the same symbol, as she often appears dressed in antique statues and gems. And Pausanias^d observes of the Arabians, that they forbore to offer any violence to the

^a Lib. ii. cap. 74.^b De Animalib. lib. xvii. c. 5.^c Aspidecincta comas——Valer. Flacc. Argonautic. lib. iv. ver. 418. Dextrâ levâque
fulcis insurgentium viperarum cohibita. Apuleius Metam. lib. ii. p. m. 240.^d Boetic. p. m. 303.

Vipers, which were found near the Balsam-tree, as reputed them holy. The footsteps of which superstition still remain among these people to this very day: for Vellingius^c saw many of them take these creatures into their houses, feed them, and worship them as the Genii of the place. The same odd fancy obtains in the East-Indies: for the king of Calicut causes cottages to be set up for Serpents to keep them from the rain, and makes it death to any that shall hurt one of them; thinking them to be heavenly spirits, because they can so suddenly kill men^f. A remarkable instance of such an opinion as this we have in the history of St. Paul^g, whom the people of Malta, when they saw the Viper leap upon his hand, presently concluded to be a murderer; and as readily made a god of him, when, instead of having his hand inflamed, or falling down dead, (one or other of which is usually the effect of those bites) he without any harm shook the beast into the fire: it being obvious enough to imagine, that he must stand in a near relation at least to the gods themselves, who could thus command the messengers of their vengeance, and counterwork the effects of such powerful agents.

I have sometimes thought that this might be the reason, why antiquity not only represented the first masters of Physic, Hermes, Æsculapius, Hippocrates, &c. in their statues and medals, with a Viper added to their figure, but also worshipped them under this form: for diseases in those days, especially the most violent, plagues, fevers, &c. were in like manner, as these creatures, reputed the commissioned messengers of divine anger and displeasure^h. They therefore, who by their art could cure and stop the course of these, as they were supposed to do this by the particular leave and assistance of heaven, so had honours paid to them accordingly; and this representation was in the nature of an hieroglyphic character: for, as the learned Spanheim ob-

^c Not. in Alpin. de plant. Ægypt. cap. 14.

book v. chap. 12.

^g Act. Apost. chap. xxviii.

^h Cornel. Cels. præfat. in medicin. Morbos ait ad iram deorum immortalium relatos esse, & ab eisdem opem posci solitam.

^f Purchas's Pilgrimage,

serves ⁱ, the Viper was a symbol or emblem of divine power.

But to say the truth, that, which the ancients made the symbol of health, does not seem to have been the Viper, but the innocent Snake or Serpent of that kind, of which Lucan speaks ^k:

*Vos quoque qui cunctis innoxia numina terris
Serpitis, aurato nitidi fulgore dracones.*

And if so, the reason Macrobius gives for this custom may be a very good one; which is from the property all Serpents have of casting their exuviae, or upper skin, every year, which makes them fit emblems or representations of health: the recovery whereof from sickness and diseases may justly be looked upon as the beginning of a fresh period of life, and (as the throwing off the senectus of these creatures seems to be) the renewing of age ^l.

Be that as it will, certain it is, that such fond and superstitious fancies concerning the Viper, together with the mistaken opinion that few of its parts were exempt from poison, did not suffer the ancients to make any curious inquiries into its nature by anatomy and experiments. And this is the cause of the many errors they have delivered down to us in these points; which by gradual advances have since been rectified, and the inward make, properties, and generation of this animal, have been largely treated of, more especially M. Redi ^m, Charas ⁿ, and Dr. Tyson in his Dissection of the Rattle-Snake ^o, which is a larger species of the Viper, have taken pains on this subject, to whose discoveries what is yet wanting, we shall add at the end of this Essay.

ⁱ Divinae potentiae symbolum. Vid. Ezech. Spanheim. De usu Numismat. p. m. 125, 126, & 181, & seq.

^k Pharsal. lib. ix. ver. 729.

^l Ideo simulacris eorum [Æsculapii & Salutis] junguntur figuræ draconum, quia præstant ut humana corpora, velut infirmitatis pelle deposita, ad pristinum revirescant vigorem: ut virescunt dracones per annos singulos, pelle senectutis exuta. Saturnal. lib. i. c. 20.

^m Osservazioni intorno alle vipere.

ⁿ Nouvelles experiences sur la vipere,

^o Philosophical Transactions, vol. xii.

Nº 144.

The symptoms, which follow upon the bite of a Viper, when it fastens either one or both its greater teeth in any part of the body, are an acute pain in the place wounded, with a swelling at first red, but afterwards livid, which by degrees spreads farther to the neighbouring parts; with great faintness, and a quick, though low, and sometimes interrupted pulse, great sickness at the stomach, with bilious, convulsive vomitings, cold sweats, and sometimes pains about the navel; and if the cure be not speedy, death itself, unless the strength of nature prove sufficient to overcome these disorders: and though it does, the swelling still continues inflamed for some time; nay, in some cases more considerably upon the abating of the other symptoms, than at the beginning. And often from the small wound runs a sanious liquor, and little pustules are raised about it: the colour of the whole skin, in less than an hour, is changed yellow, as if the patient had the jaundice.

These mischiefs (although different climates, the season of the year more or less hot, the greater or lesser rage of the Viper, the animal itself of a larger or smaller size, and consequently able to communicate more or less venom, the wound made deeper, in a part more nervous or tendinous, and therefore receiving more of the poisonous liquor, and the like circumstances, may variously heighten or abate them, yet) usually discover themselves much after the same manner in all: unless the bite happen not to be accompanied with the effusion of that liquor, which is the main instrument and cause of this violent and shocking disturbance.

But before I proceed to inquire into the nature and manner of the acting of this juice, it may not be improper to take notice, that the true use of it is to perform an office of so great moment to the preservation of the individual, that without it this creature could not subsist.

For Vipers live chiefly upon lizards, frogs, toads, mice, moles, and the like animals, which they do not chew, but swallow down whole; in which manner they lie in the stomach, or if that be
not

not big enough to receive them, partly in that, and partly in the œsophagus, which is membranous and capable of great distension; till by the salival juices of those parts, together with the help of the fibres of the stomach, and the contraction of the muscles of the abdomen, they are gradually dissolved into a fluid substance, fit for the nourishment of their bodies, which is the work of many days. This is one reason why these creatures can live so long without taking any fresh food, which I have known them to do five or six months; as another is, that their blood is a grosser and more viscid fluid than that of most other animals: so that there is but a very little expence of it by transpiration, and consequently less need of recruit. This not only microscopes discover, but reason teaches: because there is but very little muscular force in the stomach to comminute the food, and make a chyle of fine parts; and therefore the blood must accordingly be of a tough and clammy consistence. Besides, the heart of a Viper has properly but one ventricle, and the circulation of the blood is performed after the same manner as it is in a frog and tortoise, in which not above one third of it passes through the lungs: upon which account its comminution in them by the air is proportionally lesser than in other animals. Now such a manner of feeding as this does necessarily require, that the prey should upon the first catching be immediately killed: otherwise it were by no means fit to be let into the stomach. For we are not to think that the force of this part would be alone sufficient to destroy it, the subtilty of a living creature (besides the consideration of the weakness of the fibres) being in a great measure able to elude that; as indeed we every day find live animals in the ventricles of others: and therefore to do this is the proper use both of the teeth and their poison; for which being designed and adapted, it is no wonder if the Viper, this same way by which it destroys its prey, proves sometimes mischievous to any other creatures besides, when it happens to be enraged, or by any provocation stirred up to bite.

The description of the poisonous fangs, their make, articulation and motion, as also of the glands that separate the yellowish
F liquor,

liquor, and the bags that contain it, I shall give, together with some anatomical observations, at the end of this discourse.

This venomous juice itself is of so inconsiderable a quantity, that it is no more than one good drop that does the execution. And for this reason authors have contented themselves with trials of the bite upon several animals, never essaying to examine the texture and make of the liquor itself: for which purpose I have oftentimes by holding a Viper advantageously, and enraging it till it struck out its teeth, made it bite upon somewhat solid, so as to void its Poison; which carefully putting upon a glass plate, I have with a Microscope, as nicely as I could, viewed its parts and composition.

Upon the first sight I could discover nothing but a parcel of small salts nimbly floating in the liquor; but in a very short time the appearance was changed, and these saline particles were now shot out as it were into crystals of an incredible tenuity and sharpness, with something like knots here and there, from which they seemed to proceed: so that the whole texture did in a manner represent a spider's web, though infinitely finer, and more minute; and yet withal so rigid were these pellucid spicula, or darts, that they remained unaltered upon my glass for several months^p.

I have tried several ways to find out, if I could, under what tribe of salts these crystals are to be ranged, and to discover what alterations they make in the blood: and not without some difficulty, by reason of the minute quantity of the liquor, and the hazard of experiments of this kind, some curious friends, and myself together, made the following observations.

About half an ounce of human blood received into a warm glass, in which were five or six grains of the Viperine Poison newly ejected, was not visibly altered either in colour or consistence: it then was, and remained undistinguishable from the

same blood, taken into another glass, in which was no Poison at all.

These portions of blood were severally mixed with acids and alkali's: the empoisoned blood was, after such mixtures, of the same colour and consistence as the other.

Spirit of nitre, spirit of salt, and juice of lemons, severally poured upon the sanies itself, produced neither fermentation, nor any change of colour.

Salt of tartar run per deliquium, and the simple spirit of hartshorn, dropped upon the venom, neither altered its colour, nor raised any ebullition.

Syrup of violets mixt with the Poison did not change its colour either to red or green.

The tincture of heliotropium, that is, blue paper, was not altered by the sanies ejected upon it: and this drying still retained its yellowish colour.

We caused several animals, dogs, cats, and pigeons, to be bit by an enraged Viper; which generally died, some in a longer, others in a shorter space of time. But we constantly observed, that they all immediately upon the bite shewed, with signs of acute pain, marks of their life being affected by sickness, faintings, convulsions, &c.

The head of a large Viper lay three hours after it was cut off: it was perfectly flaccid and without motion. A pigeon wounded upon the breast with the fangs of this head, was presently convulsed, &c. as from the bite of the animal, and died in seven hours.

We contrived a sharp steel needle to be made, crooked, in shape not unlike to the Viper's tooth, with a sulcus or hollow on the convex part, not far from the point: into this we put a drop of the venom, and with it wounded the nose of a young dog. It produced the usual disorders of vomiting, purging, &c. but in a less degree, and the dog recovered. It was remarkable, that upon making the wound the dog cried but little, till

the Poison came into it: but then he howled, &c. in the same manner as if bit by the Viper itself. But a pigeon pricked in the fleshy part of the breast by the same poisoned needle, suffered as from the bite, and died in about eight hours.

We made these last experiments, with a view to the controversy between Signor Redi in Italy, and Monsieur Charas in France. The former, from trials of the same kind with those we have now mentioned, affirmed that the venom of the Viper lay in the yellow liquor of the gums. The latter, in opposition to this, espoused a notion advanced first by Van Helmont, and placed it altogether in the enraged spirits of the creature, calling this yellow liquor a pure innocent saliva; and alledged in proof of his assertion several experiments he made, with a success quite different from that, with which Signor Redi made his.

The most that can be concluded from hence, I think, is this, that although the Vipers in Italy do not differ in their nature from those in France; yet there is a great deal of difference in the success of the same experiments, when faithfully and judiciously made, and when they are cautiously and timorously managed, lest they should happen to overthrow a darling hypothesis.

And therefore, Monsieur du Verney in the Royal Academy, and Dr. Areskine, then at Paris, confirmed the opinion of Signor Redi, by several trials which they made with the same effect: as I was afterwards informed by the doctor himself.

We resolved to end our poison-inquiries by tasting the venomous liquor. Accordingly, having diluted a quantity of it with a very little warm water, several of us ventured to put some of it upon the tip of our tongues. We all agreed, that it tasted very sharp and fiery, as if the tongue had been struck through with something scalding or burning. This sensation went not off in two or three hours: and one gentleman, who would not be satisfied without trying a large drop undiluted, found his
tongue

tongue swelled with a little inflammation, and the foreness lasted two days. But neither his nor our boldness was attended with any ill consequence.

This is no objection to the hurtful quality of this juice: for as some chemical liquors ferment with others of a certain kind only; so these poisonous salts may affect one fluid of the body, and not another. Which that is, we shall shew anon. It is sufficient to the present purpose to say, that the saline spicula are broken and dissolved in the mouth by the clammy salival humour: and if any of them should pass thence into the stomach and intestines, the balsam of the bile will be an antidote there, powerful enough to overcome their force.

These experiments upon the Viper poison and the blood, are a sufficient confirmation of what has been advanced in the Introduction, that the nervous liquor only is affected by this venom; and at the same time afford a convincing proof, how much those scanty principles of our chemists, acid and alkali, fall short in explaining the actions of natural bodies: since neither of these salts could in any way be found to affect the viperine venom.

Before I proceed, I must take notice, that even some of the ancients were thus far rightly apprised of the nature of this Poison. Of this Galen gives us testimony in several places; particularly in his book *De temperamentis*^a, where he takes notice, that “nothing has the same power upon the human body outwardly as inwardly. Thus, (says he) neither the venom of the Viper, nor of the Asp, nor frothy spittle of the mad Dog, are alike mischievous when they fall upon the skin, or enter into the stomach, as when outwardly communicated by a wound.”

And therefore Lucan, (who being an historical poet, makes amends for what is wanting of invention, by the spirit and judgment always shewn in his descriptions) introduces brave Cato,

^a Lib.iii. cap. 2.

when marching the remains of Pompey's army through Africa, very wisely telling the soldiers, almost choaked with thirst, yet afraid to drink of a spring they came to, because full of serpents^r :

*Noxia serpentum est admisto sanguine pestis :
Morsu virus habent, & fatum dente minantur :
Pocula morte carent—*

Mixt with the blood, the Serpent's Poison kills ;
The bite conveys it ; death lurks in the teeth :
Swallow'd it works no harm—

In the like manner it was in those times also known, that the virulent juice had the same bad effects, when mixt with the juices of the body, by means of a common wound, as when communicated by the venomous bite. This made Celsus^s advise, in sucking out the Poison, to take care there be no ulcer in the mouth : though this caution be rather flighted and ridiculed by Severinus^t and others ; who hereby discover how little they understood of the seat and nature of this Poison. And Galen^u mentioning the story of Cleopatra, relates from other authors, that she killed herself by pouring the virus of an Asp into a wound made in her arm by her own teeth.

In short, it is upon this foundation that Pliny^x assures us, the Scythians poisoned their arrows with the sanies of Vipers mixt with human blood. The way of doing it Aristotle^y has at large related : and the Tartars are said to use the like trick to this day. After the same manner the Indians make use of the venom of the lizard, called Gecco. This creature they hang up by the tail, and by whipping exasperate till it discharge its virus,

^r Lucan. Pharsal. lib. ix. ver. 614.

^s Loc. ante citat.

^t Vipera

Pythia, p. 361.

^u De Theriac. ad Pison. lib. i. c. 1. Vid. etiam c. 10.

^x Nat. Hist. lib. xi. c. 53. Scythæ sagittas tingunt viperinâ sanie & humano sanguine: irremediabile id scelus.

^y De mirabilibus.

in which they tinge their darts : and a very slight wound with these weapons is speedy death ^z.

A later author, in his description of the cape of Good Hope ^a informs us, that the way by which the inhabitants there, called Hottentots, kill great wild beasts, lions, tigers, elephants, &c. is this : they take the bladders of Poison with their liquor out of the gums of that deadly kind of serpents, which the Portuguese call Cobras de Capello : these they dry in the sun, and grind them to powder betwixt two stones : this powder they make into a paste with the spittle or slabber of the same creature : which paste they rub upon the points of their darts, and lay them by to dry for their use.

Having in the Introduction explained in general the manner in which this Poison, in common with all others of the animal kind, acts upon the body ; I shall only here add the reason of one particular effect of it, which is thought very extraordinary and surprising, that is, the jaundice.

The jaundice is a suffusion of bile upon the surface of the body, and indeed upon all the inward membranes also. The bile is a natural sapo, that is, a mixture of oil, water, and a salt both volatile and fixt, separated in the liver. That the secretion of it may be rightly performed, it is requisite (as in all animal secretions) that there be a due proportion of its several parts, and also that there be a right disposition of the secretory vessels. These compounding parts cannot be supposed to be altered in so short a time as is here mentioned : but a constriction, or nervous spasms, may almost suddenly so streighten the orifices of the ducts, into which the bile is to pass, that its derivation into them will be stopt ; and consequently it must remain in the blood, which in the course of circulation will discharge it upon the whole body.

^z Bont. Histor. Ind. lib. 5. c. 5.
lierg, in High Dutch, 1719. pag. 532.

^a Peter Kolben, printed at Norim-

This is a jaundice of the same kind with that which follows sometimes upon violent cholic pains, in which the spasmodic contraction of the membranes of the abdomen interrupts the motion of the bile through the hepatic canals: the cure of which therefore is by plentiful dilution and anodyne medicines.

The case is quite otherwise in the common jaundice, which is a disease of the liver. In this the fault lies in the bile itself. For though it is usually said, that this is an obstruction in the liver; yet it ought to be considered, that the vessels are rarely obstructed but by the disorder of the liquors they carry; and consequently that an ill state of the bile must be, except in some extraordinary cases, antecedent to an obstruction in its ducts: and therefore, as the alterations of so compounded a fluid are different, so the jaundice is accordingly attended with different, nay sometimes with contrary symptoms. In some cases, without a fever, the fæces of the intestines are hard and white with great costiveness: in others a diarrhoea with a fever, and yellow discharges, weakens the patient. In the former (the consequent generally of an inactive sedentary life) for want of a due quantity of salt, the oily part of the bile grows viscid and thick, and stagnates in the ducts of the liver: in the other (owing to plentiful living, and drinking spirituous liquors) the volatile part of the salt prevails too much, and the bile becomes too thin, hot, and irritating.

There is another disease, which though it be thought to belong to another part, yet is indeed so much a-kin to the jaundice, that it may be properly mentioned on this occasion, I mean the diabetes. For this is not, as physicians have commonly judged, a distemper of the kidneys, but of the liver, proceeding likewise from a vitiated mixture of the bile. It happens most frequently to those, who without due exercise indulge themselves in drinking vinous liquors, and then quench their thirst arising from these, by too great a quantity of such as are cooling.

By such ill-timed heating and cooling of the humours of the body, the natural proportion of salt in the bile, by which its oily part is incorporated with the water, is not sufficient, now the water over-abounds, to preserve the mixture: so that a great portion of this, together with some of the thinnest of the oil, will be discharged by the kidneys; and the urinary ducts will be greatly enlarged by a constant afflux that way. By which means the thicker oily particles are left in a degree of coagulation in the smaller tubes of the liver, and are there formed into a hard fatty substance.

The dissection of those, who have died of the diabetes, proves this to be so: for I have always found a steatomatus collection in their liver, in appearance not unlike to what is often discharged by stools in a confirmed jaundice, but of a harder consistence.

As to the sweetness of the urine, this is all bilious: for the water of the bile separated from its salt is sweet. Ox gall, by a chemical distillation, yields four parts in five of water^b. This I have observed to be fragrant, as if perfumed with musk. The urine in the beginning of a jaundice very often smells like violets; and in a diabetes the flux is usually lessened towards the latter end of life, and the water is as bitter as gall: plain indications of a like origin of two distempers seemingly very different. Neither can I omit to take notice, that the cure of a diabetes confirms these remarks: for this is chiefly done by supplying the blood with a quantity of fixt salt, particularly such as is contained in lime water, and in that of the hot-well at Bristol, which is indeed a natural lime water. But what might be said on this subject would require a just discourse. It is time to come to the cure of the Viper-poison.

There was formerly in Africa a nation of people called Pfylli, famous for the cure of the bite of Serpents, with which that

^b Vid. Haller. Not. in Boerhaav. Institut. Medic. §. 99.

country above all others abounds. These people were thought to have something in their constitution so contrary to Poison, that no venomous creature would touch them: and it was pretended, that they made this a trial of the legitimacy of their children. The truth of the matter is: they performed the cure in a manner very surprising to the vulgar, that is, by applying their mouth to the wound, and sucking out the venom. The Marfi in Italy pretended to the same power^c. Some ceremonies, to over-awe the patient, and gain reverence to the operator, were added to the performance: but Celsus, the Latin Hippocrates, has wisely observed, that “These Psylli had no particular skill in
 “ this management, but boldness confirmed by use: for the Poi-
 “ son of the Serpent, as likewise some hunting Poisons, which
 “ the Gauls particularly make use of, are not hurtful in the
 “ mouth, but in a wound. Therefore whosoever will, after
 “ their example, suck the wound, will be in no danger himself,
 “ and will save the life of the wounded person^d.” Aristotle has hinted something to this purpose. “The spittle of a man (says
 “ he) is an enemy to the bites of most Serpents^e.” And Nicander observes, “That Serpents fly from even the smell of hu-
 “ man spittle^f.”

Pliny expresses the thing still in a stronger manner, and affirms, “That there is in all men a Poison, which kills Serpents:
 “ and that these creatures run away from spittle, as they will
 “ from the touch of scalding water^g.”

^c Vid. Plin. Hist. Nat. lib. vii. c. 2. Ælian. Hist. Animal. lib. i. c. 57. Et Lucan. lib. ix. ver. 891.

^d Neque hercule scientiam præcipuam habent hi, qui Psylli nominantur, sed audaciam usu ipso confirmatam. Nam venenum serpentis, ut quædam etiam venatoria venena, quibus Galli præcipue utuntur, non gustu, sed in vulnere nocent. Ergo quisquis, exemplum Psylli secutus, id vulnus exfuxerit, & ipse tutus erit, & tutum hominem præstabit. Medicin. lib. v. c. 27.

^e Hist. Animal. lib. viii. c. 29.

^f Πολλάκι καὶ βροτέων σιάλων ὑποέτεσαν ὀδμήν.

Theriac. ver. 86.

^g Omnibus hominibus contra serpentes inest venenum, feruntque ictum salivæ, ut ferventis aquæ contactum, fugere. Loc. citat.

It may therefore justly seem strange, that, upon so good an authority as that of Celsus, (who generally gives us the methods of the Greek physicians and surgeons) so beneficial and easy a practice as this of the Pfylli should not have been perpetuated by physicians. But the notion, that a Poison so fatal in a wound, could not be taken into the mouth without hurt, was, no doubt, the obstacle : especially when it was imagined, that outward applications would answer the purpose as well, without any hazard.

However, this method of cure ought, I think, to be revived : and there happened, about three years ago in London, a very remarkable case, which confirms the success of it.

The story is this, as related to me by an ingenious and experienced surgeon, who saw the case at the latter end of it. A man was bit on one of his fingers by a Rattle-snake, just then brought over from Virginia. He immediately put his finger into his mouth, and sucked the wound. His under-lip and tongue were presently swelled to a great degree : he faltered in his speech, and in some measure lost his senses. He then drank a large quantity of oil, and warm water upon it, by which he vomited plentifully. A live pigeon was cut in two, and applied to the finger. Two hours after this, the flesh about the wound was cut out, and the part burnt with a hot iron, and the arm embrocated with warm oil. He then recovered his speech and his senses. His arm continued swelled the next day, but by common applications soon grew easy, and the patient suffered no farther mischief.

As the Poison of this Snake is more quick and deadly than any other, that we know ; a remedy for this will most certainly prove effectual against that of smaller Vipers, and all other creatures of this kind. The other applications here made use of (the vomit excepted) could be of no service. The pigeon ; the cutting and burning the part, two hours after the wound had been made, did no good. Embrocating the arm with oil only

abated the swelling. Therefore the physicians of the Royal Academy at Paris gave a right judgment of this application, in a like case. An account having been given in our Philosophical Transactions ^h of an experiment made, in which it was pretended that common oil, rubbed into the wound, had cured the bite of a Viper; they with all possible care made several trials with it, and pronounced it to be ineffectual; any farther than as it might be a fomentation to the tumefied part ⁱ.

The first thing then to be done upon the bite of a Viper, of any kind, is that the patient should immediately suck the wound himself, if he can come at it: if he cannot, another person should do this good office for him. Whoever does it, ought (to prevent any inflammation of the lips and tongue, from the heat of the Poison) to wash his mouth well beforehand with warm oil, and hold some of this in the mouth while the suction is performing.

After this is over, it will be proper to give a vomit. A dose of Rad. Ipecacuan. encouraged in the working with oil and warm water, may be sufficient. The good effect of this is owing to the shake, which the action of vomiting gives to the nerves; whereby the irregular spasms, into which their whole system might be drawn, are prevented.

To confirm this practice, I have been assured by an ingenious surgeon, who lived in Virginia, that the Indians there cure the bite of the Rattle-snake, by sucking the wound, and taking immediately a large quantity of a decoction of the Seneca Rattle-snake root, (which vomits plentifully) and laying to the part the same root chewed.

As to any other external management, I think it can avail but little: since it cannot prevent the sudden communication of the Poison to the nerves. Burning the part with a hot iron is of no use. Dry salt upon the wound, recommended by Celsus ^k,

^h N° 443.

ⁱ Mem. Acad. Sc. Par. an. 1737.

^k Lib. v. c. 27.

promises somewhat more, but not much. The celebrated Snake-stones, brought from the East-Indies, and said to be taken out of the head of the Cobra de Capello, have no virtue to be depended on. This Signor Redi ¹, Monsieur Charas ^m, and myself have experienced. They will indeed, when applied, stick to the wound for some time; being, as appears from their make, not natural but factitious bodies, compounded most probably of calcined bones, and some testaceous substances mixt together: but when they drop off, they are found to have imbibed nothing of the venom.

More is to be said for the remedy of our Viper-catchers, in which they place so much confidence, as to be no more afraid of a bite than of a common puncture; immediately curing themselves by the application of their specific.

This, though they keep it as a great secret, I have however upon strict inquiry found out to be no other than the Axungia Viperina presently rubbed into the wound. And to convince myself of its good effects, I enraged a Viper to bite a young Dog in the nose: both the teeth were struck deep in; he howled bitterly, and the part began to swell: I diligently applied some of the Axungia I had ready at hand, and he was very well the next day.

But because some gentlemen, who saw this experiment, were apt to impute the cure rather to the Dog's spittle (he licking the wound) than to the virtue of the fat; we made him to be bit again in the tongue, forbearing the use of our remedy; and he died within four or five hours.

At another time I made the like trial with the same success.

As this Axungia consists of clammy and viscid parts, which are withal more penetrating and active than most oily substances; so these, without all doubt, may, if immediately applied, involve, and as it were sheath, the volatile salts of the venomous liquor, and thus prevent their shooting out into those crystalline spicula,

¹ Esperienze intorno alle cose naturali.

^m Pag. 66.

which

which we have observed to be the main instruments of that deadly mischief, that attends the bite.

But even this cure ought not to be relied on. 'Tis safest to use the method we have mentioned : and moreover, if the patient feels any sickness, faintness, or any of the nervous symptoms we have described ; he must be put into bed, and a sweat must be promoted by cordial medicines, particularly the Confect. Raleigh. and the salt of Vipers, or, in want of this, salt of Hartshorn, given in warm wine. I have often experienced the good effects of this proceeding : and, after all the pretensions of the cure by oil, in the case above related ⁿ, the man was really not recovered without these means.

I shall conclude with some hints, concerning the use of the Viper in physic : because authors are very large in enumerating its virtues against many, and some of them, very obstinate distempers.

One of the first, whom we find in antiquity to have made use of the flesh of this creature to medicinal purposes, was, I think, Antonius Musa, the famous physician to Octavius Cæsar ; of whom Pliny ^o tells us, “ That when he met with incurable ulcers, he ordered the eating of Vipers, and by this means they were quickly healed.”

It is not improbable, that he might have learned this from the great Greek physician Craterus, mentioned often by Cicero in his epistles to Atticus ; who, as Porphyrius ^p relates, “ very happily cured a miserable slave, whose skin in a strange manner fell off from his bones, by advising him to feed upon Vipers dressed after the manner of fish.”

Be this as it will, in Galen's time the profitable qualities of the Viper were very commonly known. He says, that they, who are afflicted with the Elephantiasis, are wonderfully relieved by

ⁿ Phil. Transact. N^o 443.
ab animal. lib. i. p. 16.

^o Lib. xxx. c. 13.

^p De abstinent.

eating Vipers, dressed like eels: and relates very remarkable stories of cures of this disease, performed by the Viper-wine ^d.

Aretæus, who most probably lived about the same time with Galen, and of all the ancients has most accurately described the Elephantiasis, commends, as Craterus did, the eating of Vipers instead of fish in the same disease ^e. And to this purpose I remember, that as Lopes ^f, in his relation of the kingdom of Congo in Africa, takes notice how greedily the negroes eat adders, roasting them, and esteeming them as the most delicious food; so Dampier ^g also informs us, that the natives of Tonquin in the East Indies treat their friends with arack, in which Snakes and Scorpions have been infused, accounting this not only a great cordial, but also an antidote against the leprosy, and all other sorts of Poison.

I have since been told by a learned physician, who resided many years at Bengal, that it is a constant practice there to order in diet the Cobra de Capello (the Viper of that country) to persons wasted by long distempers.

The physicians in Italy and France very commonly prescribe the broth and gelly of Vipers flesh for much the same uses, that is, to invigorate and purify the mass of blood exhausted with diseases, or tainted with some vicious and obstinate ferment.

From all this it appears, that the main efficacy of the viperine flesh is to quicken the circle of the blood, promote its due mixture, and by this means cleanse and scour the glands of those stagnating juices, which, turning to acidity, are the origin of many, at least, of those troublesome distempers in the surface of the body, which go under the names of scrophulous, leprous, &c.

^d De arte curat. ad Glauc. lib. ii. c. 10. & De simpl. medic. facult. lib. xi. c. 7.

^e Curat. diuturn. lib. ii. c. 13.

^f Vid. Purchas's Pilgrims, part II. book vii.

chap. 4. § 3.

^g Voyages, Vol. II. part I. p. 53.

These good effects are owing to that penetrating, strong salt, with which the substance of these creatures does, in a very great proportion, abound; and the reason of this is from the food they live on, which we have observed before to be lizards, moles, &c. whose nature every one knows to be such as must necessarily, when they are dissolved in the stomach, supply the blood with a great quantity of active and volatile parts. And herein lies the difference between the flesh of Vipers, and that of other innocent Serpents, which feeding chiefly upon grass, herbs, &c. do not recommend themselves to us by any of those properties, which are in so eminent a degree found in the former.

Whosoever reflects on what has been said on this head, will very readily acknowledge, that our physicians deal too cautiously or sparingly with a remedy, which may be applied to very good purposes, when they prescribe a few grains of the powder of dried Vipers, or make up a small quantity of their flesh into Troches. Whereas, that service may really be done this way, the patient ought to eat frequently of Viper gelly, or broth; or rather, as the ancient manner was, to boil Vipers, and eat them like fish; or if this food will not go down, (though really very good and delicious fare) to make use at least of wine, in which dried Vipers have been digested six or seven days, in a gentle heat^a, from which I have seen very good effects in obstinate lepra's; or lastly, (in some cases especially, where wine is not convenient) to take either the powder, or good quantities of the viperine salt, in which alone the virtue of all medicines made from this creature resides. And therefore the salt of any other animal, which is still more pungent and stimulating than this, (as is particularly that of Cantharides) is yet a more powerful remedy in dry and scaly leprous eruptions; which may without any inconvenience be given in the form of a tincture made with spirit of wine^{*}.

^a Vid. Pharmacop. Lond.

^{*} Vid. eand. Pharmacop.

A N

A P P E N D I X,

CONTAINING

An anatomical description of those parts in a Viper,
and in a Rattle-snake, which are concerned in
their Poison :

W I T H

A short ACCOUNT of some other venomous Animals.

IN order to give a full view of the instruments of death in a Viper, and that larger species of it, the Rattle-snake, I shall explain the figures drawn from dissections of them both, beginning with the lesser animal, and ending with the bigger. And if some things are repeated in the latter, which had been observed in the former, this will not be thought tedious : because in subjects so minute, it is sometimes necessary to represent the same parts in different situations and connexions, that the uses assigned to them may be the more clearly understood. And for this reason, I shall not follow the order of the figures, so much as I shall the thread of the description, which they are designed to explain.

T A B L E I.

Exhibits several views taken from the head of the common Viper.

Fig. 1. shews a side view of the skull and jaws: in which

a. Represents two poisoning fangs on each side, fixed (in a manner to be described hereafter) in a solid bone on each side *b.* These solid bones are articulated by a ginglymus, as it were pendent to the two zygomata: upon which, with the poisoning fangs, they receive two motions; viz. production, by which the fangs are erected; and retraction, by which these fangs are brought in, and couched against the roof of the mouth, so as to admit of closing the jaws.

Fig. 5. *a.* shews these fangs magnified.

These motions are produced by a thin slip of bone, Fig. 1. *c.* and Fig. 5. *d.* which being connected to the bone *b.* below its articulation, makes it to join in the motions of production and retraction, which it receives itself by being connected to the bone, Fig. 5. *c.* which is produced and retracted as well in conjunction with the under jaw, to which it is connected, as by the action of muscles properly formed and subservient to itself.

Fig. 1. *f.* shews the under jaw, and

d, e. its two fulcra, by the help of which it receives variety of motions necessary in swallowing its prey.

Fig. 6. shews these two fulcra *a* and *b*, by the intervention of which the under jaw is connected to the sinciput and temporal bone.

In order to understand the manner by which the Viper swallows its prey, it must be observed, that the upper and lower jaw on one side move independently of the upper and lower jaw on the opposite side; so as that the upper and lower on one side can be protruded or retracted, while the correspondent parts on the opposite side are either employed in contrary motions, or held.

Tab: 1.

Fig. 1.

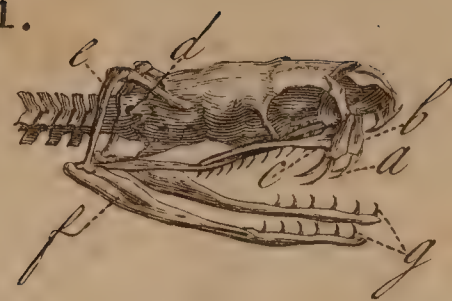


Fig. 7.



Fig. 2.

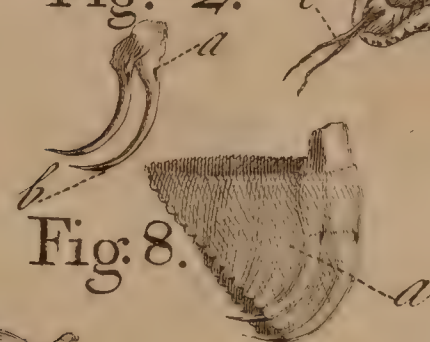


Fig. 3.



Fig. 8.

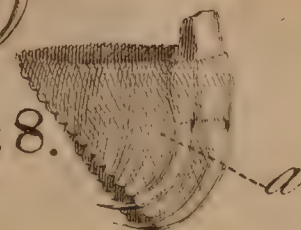


Fig. 4.



Fig. 9.



Fig. 5.

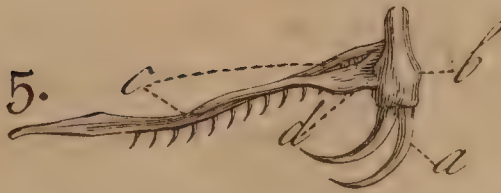


Fig. 10.

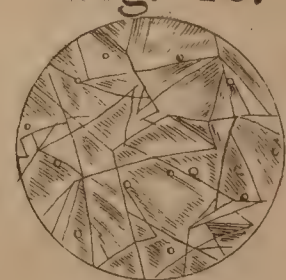


Fig. 6.



held firm and unmoved : and being furnished with small teeth firmly connected to their surfaces, which from their office we may term holders, Fig. 1. *g.* and Fig. 5. *c.* they are capable of drawing down their prey, by alternately retracting the two jaws on each side.

These holders are more numerous in the upper, than in the lower jaw.

Fig. 5. *c.* shews them in the upper jaw.

Fig. 6. *d.* shews them in the lower.

Fig. 4. shews the top of the skull : in which

a. The *sinciput* is composed of one bone, which in man is formed by the concurrence of the two parietal bones : whereas the *frons* *b*, which in man is one bone, is in this animal divided into two by a future.

c. Shews the anterior edges of the orbit of the eye formed by the frontal bone.

d. The *ossa nasi*.

e. The maxillary bone in this animal no way divided.

Before we leave the bones of this part, we must observe, that the poisoning fangs are different from the holders in other circumstances, besides their magnitude and motions. And first I must remark, that, though there are two poisoning fangs on each side ; yet it rarely happens, that they are both firmly fixed in the sockets designed for their reception. I have observed sometimes, that the external fang on each side was loose, and sometimes the internal fang on each side was loose ; and sometimes the internal on one side, and the external on the other side were loose : and that, in protruding the fangs, that, which was firmly fixed, was more erected, than that which was loose ; which it likewise always exceeded in length. From all these considerations, joined to some circumstances hereafter to be explained, I have been induced to believe, that the Viper employs but one fang at a time ; nature having so contrived, that the whole Poison prepared on one side shall as effectually be lodged in the prey by the action

of one fang, as by both, and thus be sufficient to answer its purpose.

As the fang of the Viper describes an arch of a circle in wounding its prey, so its force and strength are greatly secured by its curve form, resembling nearly the claw of a bird, Fig. 1. *a*, and Fig. 5. *a*. But as this form is necessarily attended with a great difficulty in disengaging it again from the part, into which it is struck; it must often happen, that its prey, in springing away on being wounded, must break off the fang: and the rather because the Viper, finding itself pulled away by the motions of its prey, will probably lash about its tail; till, fixing itself by it, the fang is obliged either to disengage itself, or to break off short at the socket, which is its weakest part. To remedy this inconvenience, the fang, which before was loose, probably soon becomes fixed; and the broken fang falling out, another new one is fixed (though loosely) in its place. For, to supply this loss or breaking of fangs, we always find a cluster of young fangs of different degrees of perfection, lodged in the bag near the roots of the poisoning fangs: of which I have counted six on one side in a Rattle-snake. I shall not attempt to conjecture, by what means these subsidiary fangs are from time to time conducted to the empty sockets; the several circumstances mentioned being sufficient to incline us to believe, that they serve for that purpose: as the life of the animal manifestly requires such a supply for its preservation.

These poisoning fangs are hollow from near the edge of the socket to near the point. This hollow begins by an orifice in the fore part of the tooth, Fig. 2. *a*. and terminates at some distance above the apex *b*; from whence the fang is exceeding hard and solid, and sloped off, so as to resemble in some measure the common tooth-pick.

Fig. 3. represents this hollow of the tooth, by splitting it through its axis.

The apparatus for preparing and injecting the poisonous fluid consists in a gland, Fig. 9. *c.* situated on each cheek: in which situation it is firmly connected to the sinciput at its commissure with the occiput by the ligament *a*, and to the posterior extremity of the lower jaw by the ligament *b*. From these ligaments continued on its surface the gland is furnished with a strong albugineous coat, proper to strengthen it against the great distensions, which it must suffer in accumulating its fluid, and the violent compressions in emitting it.

The same integument continued on forms the excretory duct *e*, by which the Poison is conveyed from the gland into the cavity of the erected fang, by the assistance of a bag or purse, Fig. 7 and 8, *a.* in which the two poisoning fangs are on each side contained.

f. Shews a small white gland, which, from its situation near the fangs, has been supposed to be the organ for secreting the Poison: though probably it is no more than either a lymphatic, or a salival, gland; and is entirely wanting in the Rattle-snake.

All the muscles subservient to the action of biting are in this animal so situated, as to bear strongly upon the poison gland during their action; thereby conspiring to ejaculate its fluid.

But the chief part in this ejaculation of the Poison is performed by the muscle *d*, which arising from the inferior maxilla runs obliquely upwards under the poison gland, till passing between the two ligaments *a* and *b*, it reflects itself upon the external side of the gland, and running parallel with its length, is firmly attached to it. By the assistance of the ligament *a*, which in some measure serves as its tendon, this muscle must contribute to closing the jaws: but its greatest action is to squeeze the poison gland, which it nearly surrounds; in the same manner as we usually squeeze an orange, in order to express its juice. The disposition of this muscle upon the surface of the gland in a continued course with the direction of its duct, and the terminating of this duct (which appears tendinous) at the roots of the fangs, were circumstances, which
raised

raised an opinion, that this was altogether a muscle subservient to their retraction: the contrary of which will however appear by immersing the head, when excoriated, in hot water; after which the muscle will easily separate, and leave the gland naked to view.

Fig. 7. shews the head of the Viper not dissected: in which

a. Shews the two poisoning fangs on each side inclosed in their proper bags, in which the different degrees of extension, or erection, are easily observed.

b. Shews the entrance into the trachea, so situated, as to be least liable to being compress'd in the action of swallowing.

c. Shews the tongue, by which the Viper laps the dew; and by whose action possibly the subsidiary fangs are placed in the empty sockets, as occasion may require.

Fig 8. represents the bag enveloping the two fangs, as it appears when considerably magnified; whereby the fimbriated or scalloped edge is more distinguishable. But the particular structure and office of this bag will be better explained, by viewing it bigger in the Rattle-snake.

T A B L E II.

Shews five views taken from the head of an exceeding large Rattle-snake: of which

Fig. 1. *a.* represents the maxillary bone.

b. The ossa nasi.

c. The os sphenœides.

d. The os sincipitis.

e. The two ossa frontis.

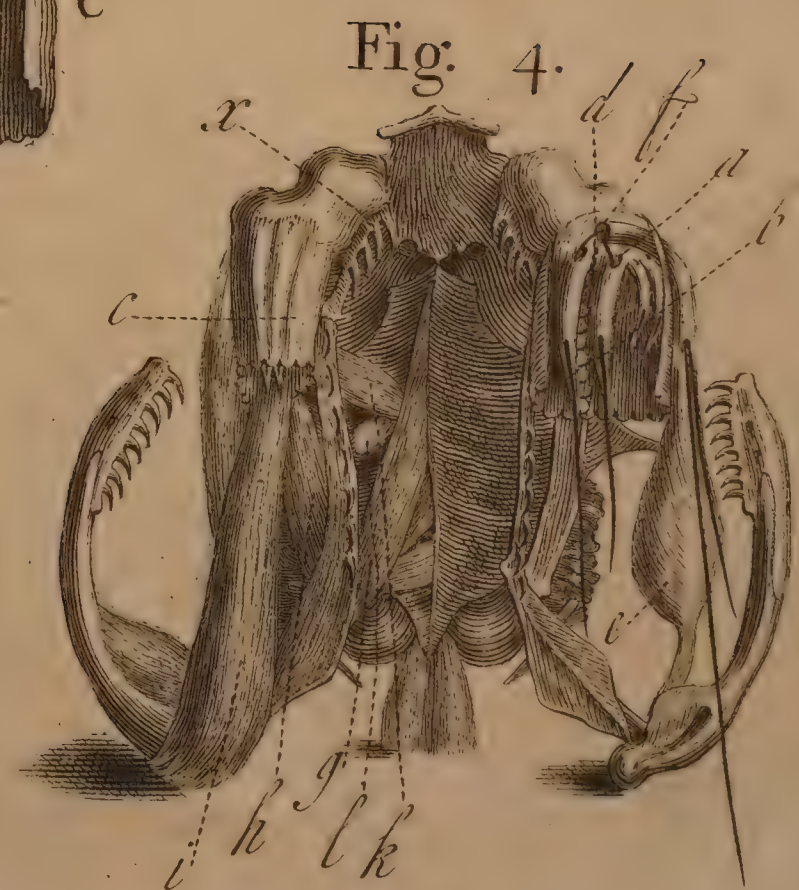
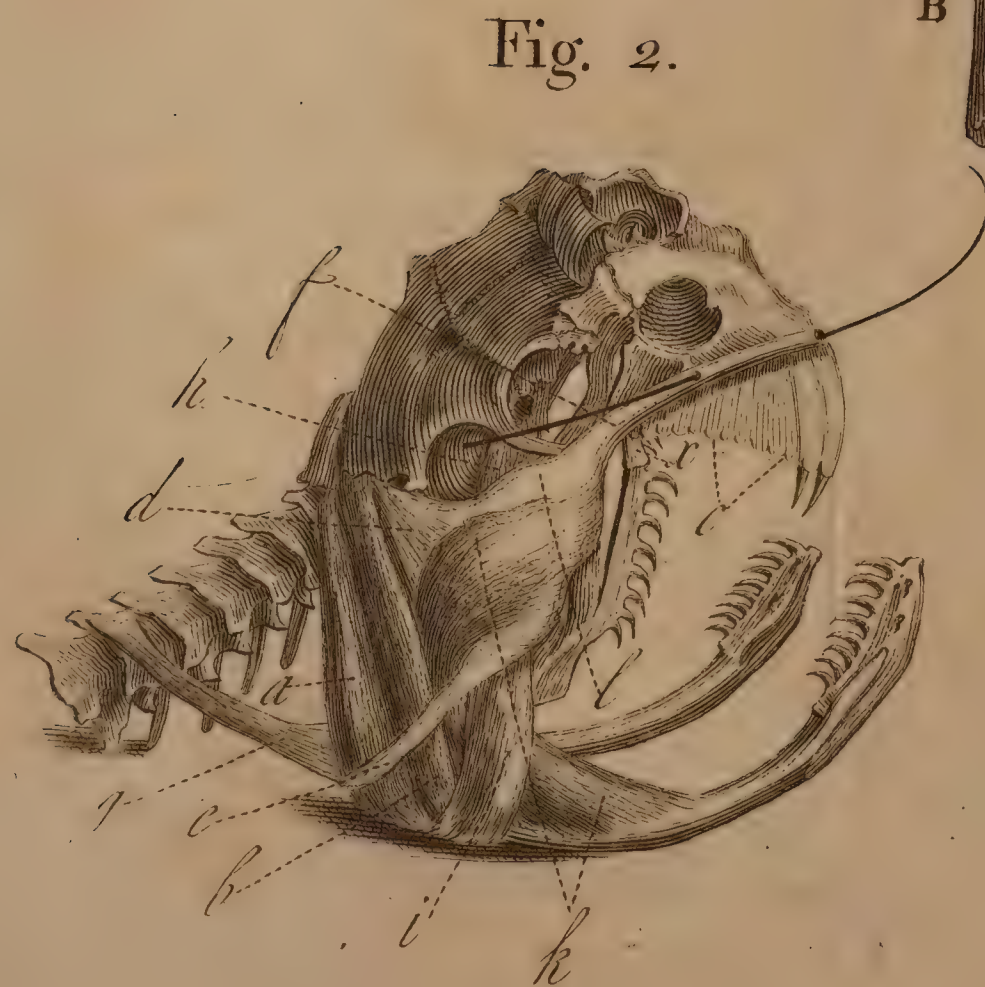
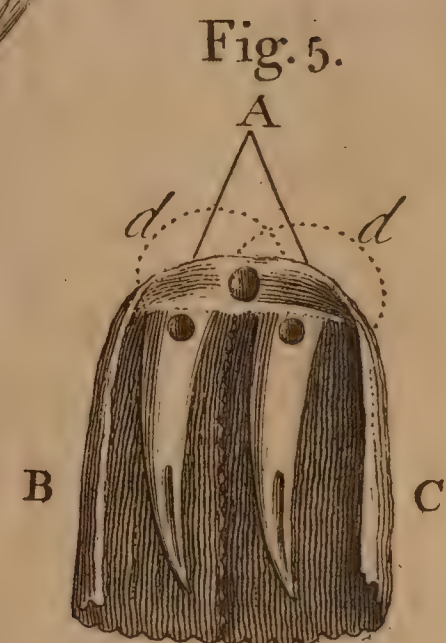
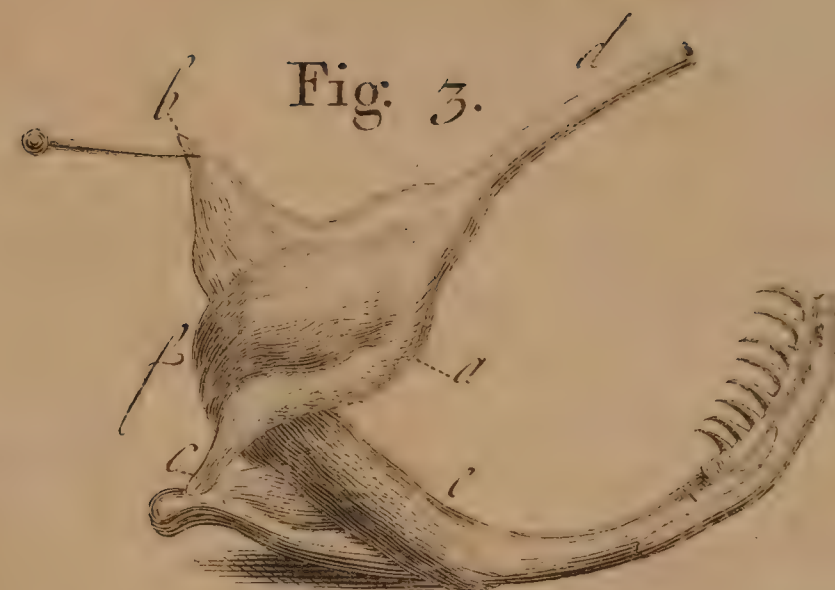
f. The os temporum, with the os auditûs like that of birds, but standing nearly parallel to the spine.

g. The os occipitis.

h. and *i.* The two fulcra of the inferior maxilla.

k. The

Tab: II.





k. The bone, in whose sockets the two poisoning fangs are received, connected by a ginglymus to

l. The zygoma.

m, m. The moveable bone of the upper jaw furnished with its holders; in which bone a joint may be observed at Fig. 2, *x*: at which joint it becomes curved, when

n. Fig. 1. a smaller splinter of bone, connected by one extremity to the former, and by the other to the bone containing the fangs, is so protruded, as to erect the fangs.

o. The posterior extremity of the under jaw extended beyond its fulcrum, in order to increase the power of a small muscle serving to open it, Fig. 2. *g*.

p. Shews a process of the under jaw analogous to the corone in other animals, into which the great elevator is inserted.

Below this process externally may be observed a large foramen, *q*. by which the blood vessels and nerves enter: which, after supplying branches to the periosteum and medullary substance, pass out again at a large internal foramen, *w*. Fig. 1. leaving some few twigs, which proceeding further pass out at two small foramina, *u*. and are spent upon the gums and under lip.

t, t. Shew the holders in each jaw, which do not appear to be connected by a gomphotic articulation, but fixed by ligaments into shallow pits or inequalities designed for their reception.

r. Shews the poisoning fangs fixed in their sockets, as they appear when almost fully erected. For a supply of these fangs, when accidentally broke out,

s. Shews several subsidiary teeth of different magnitudes in their natural situation.

Fig. 2. shews the same head, with its poison gland, and the several muscles subservient to the motions of the jaws, as they appear in their natural situation.

a. Shews a muscle, which, by being inserted behind its fulcrum, serves to open the under jaw.

b. A

b. A muscle inserted immediately before its fulcrum, serving to elevate or close the jaw.

But the most active muscle in closing the mouth and jaws seems to be *b, i.* which arising from the os incipitis, and passing down behind the poison gland, is inserted into the under jaw at such a distance from its fulcrum, as to have the advantage of all the other muscles.

d and *e.* Shew the two ligaments, by which the gland is fixed to the edge of the inciput and the extremity of the under jaw.

l. Shews the body of the poison gland, covered by an albugineous coat formed by an expansion of the two ligaments mentioned.

The same albugineous coat continued forms a large duct, *f.* by which the poisonous fluid is conveyed from the gland to the bag *c.* which envelops the poisoning fangs.

Now, although it has been observed, that the muscles *b,* and *b, i.* are so situated as to bear against the gland during their action, thereby assisting to expel the Poison; yet the greatest power in expelling the Poison seems to be in the action of the muscle *k*; which arising from the under jaw, and passing obliquely upwards behind, and in contact with, the poison gland, reflects itself forward between the two ligaments; and, after extending itself over almost the whole gland, is firmly implanted into its fore and lower part: serving thereby both to compress and contract the whole gland, and so to expel its fluid.

Fig. 3. gives a more distinct view of this gland surrounded by its proper muscle.

a. Shews the poison gland.

b and *c.* Its two ligaments.

d. Its duct.

e and *f.* The muscle surrounding it, which serves both to close the mouth in biting, or wounding its prey, and at the same time to expel the Poison.

From this view it is obvious, why a less accurate examination (in so small an animal as a Viper, and whose muscles, being white, are therefore less distinguishable from other substances) might lead inquirers into an opinion, that the whole together was a muscle sending off a round tendon, and serving to draw the fangs inward.

Fig. 4. represents an under view of the same head : in which

a. Shews the superior orifice of the poisoning fangs in their retracted state.

b. Their inferior orifice.

c. Shews the fangs as covered by their bag, when in a retracted state : which bag is cut open on the opposite side, in order to shew the fangs. And

d. A fimbriated septum attached to the orifice of the poison duct, and dividing the fangs from each other.

e. Shews the poison gland, in whose duct two bristles are placed, which, passing into the sacculus at its summit, shew the entrance of the poison duct *f*, exactly between the superior orifices of the two fangs : through which orifices the bristles entering the fangs pass out at their slits.

Fig. 2. *c.* shews this bag, whose edge is fimbriated, when stretched and expanded during the erected state of the fangs.

From this appearance it has been imagined, that the Poison being discharged into the bag, and the bag being gradually pressed up to the summit of the fangs by the sides of the wound, as the fangs were impelled deeper and deeper, this pressure of the bag, acting upon its contained fluid, would be sufficient to force and direct the Poison through the fangs into the bottom of the wound. But the loss of the fluid, which would partly escape at the gutter necessarily made by the contact of two cones, and (if their contact be not very close) between them too, with the waste of some, which would be left in the bag, have induced

me to believe, that the immision of the Poison into the wound depends on circumstances very different.

I have been led to think, that, to lessen the inconvenience of breaking the fangs, one fang only, and on one side only, is erected at one bite, as I have before hinted; and that by being erected, its superior orifice is brought nearly in contact with the orifice of the poison duct: and that, as the poison duct enters the bag exactly between the fangs, so the bag may serve to guide the duct to this or that side, according as this or that fang happens to be erected; thereby making the poison duct and the hollow of the fang one continued tube or canal.

In order to this we need only to suppose, that the fimbriated septum, which divides the two fangs, is more elastic, or yields more easily, than the sides of the bag. In this case the fang by its erection stretching the bag, the septum being weakest will follow this stretch; and its extremity, to which the orifice of the poison duct is attached, be carried to this or that side, so as to meet this or that orifice, as the pressure or erection may happen to be in this or that fang.

Fig. 5. shews

A. The part of the bag, which yields with the septum to the pressure of erection in the fang.

B, and C. The sides of the bag, which admitting no stretch themselves, may throw the whole motion on the septum and the part A.

d, d. Two arches, of either of which any necessary part may be described by the motion of the orifice of the duct, in consequence of the septum's yielding more easily than the sides of the bag. The orifice of the duct thus changing its situation may be applied to the orifice of either of the fangs occasionally, and the whole Poison prepared by the gland be employed in the action of one single fang: the advantages of which to the Viper itself have been already explained.

Fig.

Fig. 4. *g, b, i, k, l*. Muscles subservient to the motions of the jaws, whose actions sufficiently appear by their situations and directions.

To this most accurate description by Dr. Nicholls, I think it not amiss to subjoin a remark, concerning the use of the Rattle at the tail of this Snake, which has its name from it: because a vulgar error has obtained, even among the learned, about it.

It is commonly said, that this is a kind contrivance of divine Providence, to give warning to passengers, by the noise which this part makes when the creature moves, to keep out of the way of its mischief. Now this is a mistake. It is beyond all dispute, that wisdom and goodness shine forth in all the works of the creation: but the contrivance here is of another kind, than is imagined.

All the parts of animals are made either for the preservation of the individual, or for the propagation of its species: this before us is for the service of the individual. This Snake lives chiefly upon squirrels and birds, which a reptile can never catch without the advantage of some management to bring them within its reach. The way is this. The Snake creeps to the foot of a tree, and by shaking his Rattle, awakens the little creatures which are lodged in it: they are so frightened at the sight of their enemy, who fixes his lively piercing eyes upon one or other of them, that they have no power to get away, but leap about from bough to bough, till they are quite tired; and at last falling to the ground, they are snapped into his mouth. This is by the people of the country called charming the squirrels and birds.

It must likewise be observed, that this Snake does not make any noise with its Rattle in the common motions of its body.

There is something like this in the lion's hunting for his food. The hungry tyrant, by his terrible roaring in the woods, rouses the lesser beasts out of their holes : they running about in fright and surprise, are easily seized, and become a prey to his devouring jaws.

And I have myself seen, upon a hawk's settling upon a tree in a garden, the little birds all about it so struck with fear, that though they could fly backwards and forwards, for some little distance, yet they have not been able to get away from the ravenous destroyer.

POISONOUS.

POISONOUS ANIMALS.

AS the Viper is hurtful by instilling a liquid Poison into the wound made by its teeth ; so likewise all venomous creatures whatsoever, whether they bite or sting, though there be some difference in the contrivance of their organs, are mischievous after much the same manner : and the most considerable of them for the same good use and purpose, that is, in order to kill their prey.

This will fully appear, by examining the instruments of death in several of them.

First then, the Spider, which lives upon flies, wasps, and the like insects, is provided with a hooked forceps, placed just by the mouth, very sharp and fine : with this he pierces the flesh of little creatures caught in his web, and at the same time infuses a juice into the puncture ; by which means the animal being killed, he sucks out the moisture from the body, and leaves it a dry husky carcase.

Mr. Van Leeuwenhoek, in his account of Spiders, published in the Philosophical Transactions ^a, has, together with the other parts, by the help of his glasses, described these weapons ; which he finds to lie couched on each side the mouth, in a row of teeth, till they are raised to do execution. These rows of small teeth are designed to hold the prey, that it may not escape the force of the bite. And in the convex part, towards the point of each claw, he has delineated a little aperture or slit, through which he supposes the Poison issues out at the same time the wound is made.

^a N^o 271.

This:

This situation and motion of these parts I have several times viewed, but was never able to discern the outlet or opening; which, having a just deference to the industry and application of so nice an observer in things of this nature, I, at first, imputed to my own unskilfulness in such inquiries, knowing my microscope to be very good: till at last, after repeated trials, I very plainly saw, that nothing dropt out of the claws, which were always dry while the Spider bit; but that a short white proboscis was at the same time thrust out of the mouth, which instilled a liquor into the wound.

Then I concluded, that Mr. Leeuwenhoek had delineated the apertures in these weapons, only from the analogy which he thought they must bear to the viperine fangs, the sting of the scorpion, bee, &c. And I was confirmed in this opinion by examining a claw of the great American Spider, described by Piso^b, and called Nhamdu: which being above fifty times bigger than that of the largest European Spider, if there had been any slit in it, my glass would, no doubt, have discovered it; but yet I found it to be quite solid.

And indeed the quantity of liquor emitted by our common spiders, when they kill their prey, is visibly so great, and the wounding weapons so minute, that they could contain but a very inconsiderable portion thereof, if it were to be discharged that way.

To this purpose, I remember Mr. Boyle somewhere tells a story of a person blinded by a spider dropping its venom into his eye: which, though it can hardly find credit with some, is however confirmed by what Piso relates of his Nhamdu, viz. that in catching it great heed is to be taken, lest its Poison fall into the eye, this causing a total loss of the sight.

What Mr. Leeuwenhoek observes of the enmity these creatures bear to one another, I have often seen: for if four, five, or more be put together into a glass, they immediately fall to

^b Nat. Hist. lib. v. cap. 10.

fighting with all the fury imaginable. Limbs struck off are usually the preludes to the terrible slaughter, which continues till all are killed, the surviving conqueror himself most commonly dying of his wounds.

The weapons of mischief in the Scolopendra, or Centipes, are somewhat different from those in the spider. Having had one of these creatures sent to me, preserved in spirit of wine, from the East-Indies, (where they are very large, and their bite is so painful, that, as Bontius says ^c, it makes the patient almost mad) I examined the claws of its forceps by a microscope; and in each of them observed a small aperture, on the upper side near the point ^d. And Mr. Leeuwenhoek ^e, who had one of the same kind alive, found, that by pressing the claw, a small drop of liquor issued out of this hole.

The case is much the same with stinging animals. Of these the Scorpion ^f is the chief, whose virus in different countries is more or less dangerous, according as it is exalted by various degrees of heat: thus in Africa particularly, its effects are so dreadful, that, as Joan. Leo ^g tells us, the town of Pescara there, is in a manner left desolate by the inhabitants in the summer time, by reason of the great abundance of these creatures; certain death following their sting.

Several of this kind Signor Redi ^h at Florence, had sent to him from Tunis; and, it being November, he irritated them to sting pigeons, pullets, &c. without any bad effect at all: but upon the approaching spring, one of them, which had been kept all the winter, nay eight months, without any food, and the wound of whose sting before was harmless, stung to death two pigeons successively; but a third and fourth wounded in like manner, suffered no hurt. Yet having let the Scorpion rest all night, he killed another pigeon the next morning.

^c Hist. nat. & med. Ind. or. lib. v. cap. 4.

^d Vid. Tab. iii. Fig. 1 & 2.

^e Continuatio arcanor. Natur. epist. 124.

^f Tab. iii. Fig. 3.

^g Hist.

Afric. lib. vi.

^h Generazion. degli Insetti, pag. 15.

At the point of the sting he very often could discern a small drop of white liquor, which, when the wound was made, entered into the flesh.

As this liquid venom is either not separated from the blood into the cavity of the sting, during the cold of winter, or at least the Scorpion wants strength at that time to throw it out with force and energy ; so even in the hot months, after it is exhausted by two or three attacks, the sting is no longer hurtful, till the expence of this juice is recruited by time.

Viewing the sting of one of these animals brought from the East-Indies, (where they are much bigger than in Africa) I could, with a glass, easily discover a long slit, on each side of it, near to the cuspis, which is exactly delineated by Mr. Leeuwenhoekⁱ, who also saw the venom drop out of it^k.

It is very remarkable concerning this insect, what an ingenious gentleman, who lived several years in Barbary, told me, he had many times tried ; that if it be surrounded with a circle of burning coals, it does, upon the sense of the heat, turn itself violently every way to make an escape ; but finding it impossible, and the pain from the fire increasing, it strikes itself twice or thrice with the sting on the back, and immediately dies of the wounds.

The fact has since been confirmed to me by others, who have assured me, that it is a common diversion among the soldiers at Gibraltar (where these creatures abound) to make this experiment.

This self-murder decides the controversy among writers, whether poisonous animals of the same species can kill each other. Which is not only confirmed by what we before observed of the Spider, but is likewise true of Vipers : for Dr. Herman bringing from the Indies three of the Cobras de Capello, all in one glass, two of them were killed in the voyage by fighting. And the learned Jo. Rhodius at Padua observed,

ⁱ Lib. citat. epist. 123.

^k Vid. Tab. iii. Fig. 4.

that two Scorpions being put into a glafs, they fought, and one having killed the other, devoured it ¹.

As the viperine venom is the quintefcence and moft active part of thofe animal juices, with which the Viper is nourifhed; fo is alfo that of the Scorpion: for this infect lives chiefly upon locuft, &c. and the fame perfon from Barbary informed me, that feeing oftentimes locuft sticking up in the ground, as if they were fet there, by looking he found that fome part of them was always eat away; and that thefe places were the holes of Scorpions, who had dragged their prey thither, and fed on it as they had occafion.

The mechanifm of the ftinging of a Bee Dr. Hooke has very accurately defcribed ^m. One may with the naked eye fometimes fee it difcharge the venom: and in this, by the help of a glafs, I can eafily difcover a great number of minute falts floating.

And indeed this apparatus or contrivance is fo univerfal, that we find even in vegetables fomething analogous hereunto: for the laft mentioned author ⁿ has fhewn us, that the pricking points of nettles do, at the fame time they pierce the fkin, infil a venomous juice into the wound.

As the bites and ftings, not only of thefe infects we have mentioned, but alfo of feveral others, as hornets, wasps, gnats, &c. are often very troublefome, and attended with more pain, inflammation and fwelling, than would be expected from fuch little enemies; I fhall conclude with obferving, that the common cure in all accidents of this kind, will be, (as in the bite of a Viper) by immediately fucking out with the mouth the infilled poisonous drop, and applying to the wound a poultice of bread and milk: but if this has been neglected, the part be fomented with warm oil and foft difcutient ointments.

¹ Not. ad Scribon. Larg. pag. 244.

ⁿ Ibid. 25.

^m Micrograph. Obferv. 34.

E S S A Y II.

OF THE TARANTULA.

THE symptoms from the bite of the Tarantula are so very odd and surprising, that the truth of the facts has by some been called in question. There is reason for this suspicion, because the mischief commonly happens to poor people; who, as they often receive charity upon it, may be tempted to dissemble, and to act a part, as if they suffered what they really have not. And besides this, hysterical affections (as we shall observe by and by) are in this country sometimes attended with the same appearances: so that it is hard to distinguish one case from the other.

However, though there are here many deceits and impostures, yet even these, I think, are an evidence to prove the point: since it cannot be supposed, that a disease would be counterfeited, which had never any foundation in nature.

Neither can I be persuaded, that Baglivi, a native of the country, and a learned physician, (who must have known that tricks were played in this way) would have taken the pains to write a long dissertation on this subject ^a, had he not been thoroughly convinced of the reality of such a Poison.

Besides this, after Baglivi's book was published, Ludovicus Valetta, a Celestine monk of Apulia, put out at Naples a treatise

^a Vid. Baglivi de Praxi Medica, & Dissertationes, Romæ, 1696.

tise upon this Spider^b; in which he not only answers the objections of those, who deny the whole thing, but gives from his own knowledge several instances of persons, who had suffered this way: some of whom were of great families, and so far from being dissemblers, that they would at any rate, to avoid shame, have concealed the misfortune, which had befallen them.

To these may be added the testimony of the Honourable Mr. Boyle, who assures us, that having himself had some doubts about this matter, he was, after strict inquiry, convinced that the relations in the main were true^c.

I shall therefore, from the authentic accounts given by the two mentioned authors, extract what is most material and necessary to our present purpose.

The Tarantula^d is a Spider of Apulia, of the octonocular kind; that is, of that species that has eight eyes, and spins webs. It has eight legs, four on each side, and in each leg three joints. From the mouth proceed two darts, in shape just like to a hooked forceps, or crab's claws: these are solid, and very sharp, so that they can easily pierce the skin. And between these and the fore-legs there are two little horns, which I suppose answer to those bodies called from their use in flies the Feelers: because as they do, so this creature is observed to move them very briskly, when it approaches to its prey.

This, as other Spiders do, propagates its species by laying eggs, which are very numerous; so that there are found sometimes in the female, when dissected, a hundred or more: and these are hatched partly by the heat of the mother, partly by that of the sun, in about twenty or thirty days time.

There is also a Spider of the like nature with the Tarantula in the West-Indies, which Fr. Hernandez^e describes by the

^b De Phalangio Apulo opusculum, Neapoli, 1706.

^c Of languid and

unheeded motions, chap. 6.

^d Tab. iii. Fig. 5.

^e Hist. Animal.

Nov. Hispan. Tract. iv. cap. 5.

name of *Hoitztocatl*, or the pricking Spider; and says, that its bite induces madness.

In the summer months, especially when the heats are greatest, as in the Dog-days, the Tarantula creeping among the corn in the fields, bites the mowers and passengers: in the winter it lurks in holes, and is scarcely seen; and if it does bite then, it is not venomous, neither does it induce any ill symptoms.

But in the hot weather, although the pain of its bite is at first no greater, than what is caused by the sting of a bee; yet the part quickly after is discoloured with a livid, black, or yellowish circle, and raised to an inflamed swelling. The patient within a few hours is seized with a violent sickness, difficulty of breathing, universal faintness, and sometimes trembling, with a weakness of the head: being asked what the ail is, he makes no reply, or with a querulous voice, and melancholy look, points to his breast, as if the heart was most affected.

During this mournful scene, all the usual alexipharmic and cordial medicines are of no service: for notwithstanding their repeated use, the patient growing by degrees more melancholy, stupid, and strangely timorous, in a short time expires; unless music be called to his assistance, which alone, without the help of medicine, performs the cure.

For at the first sound of the musical instrument, although the sick lie, as it were, in an apoplectic fit, they begin by degrees to move their hands and feet; till at last they get up, and fall to dancing with wonderful vigour, at first for three or four hours: then they are put to bed, refreshed from their sweating, for a short time, and repeat the exercise with the same vehemence; perceiving no weariness or weakness from it, but professing they grow stronger and nimbler, the more they dance.

At this sport they usually spend twelve hours a day, and it continues three or four days; by which time they are generally freed from all their symptoms, which nevertheless attack them again about the same time the next year: and if they do not
take

take care to prevent this relapse by music, they fall into a jaundice, want of appetite, universal weakness, and such like diseases; which are every year increased, if dancing be neglected, till at last they prove incurable.

As music is the common cure, so they, who are bitten, are pleased, some with one sort of it, some with another. One is raised with a pipe, another with a timbrel: one with a harp, another with a fiddle; so that the musicians make sometimes several essays, before they can accommodate their art to the venom: but this is constant and certain, notwithstanding this variety, that they all require the quickest and briskest tunes, and are never moved by a slow, dull harmony.

While the Tarantati, or affected, are dancing, they lose in a manner the use of all their senses, like so many drunkards, do many ridiculous and foolish tricks, talk and act obscenely and rudely; take great pleasure in playing with vine leaves, with naked swords, red cloths, and the like; and on the other hand can't bear the sight of any thing black: so that if any bystander happen to appear in that colour, he must immediately withdraw, otherwise they relapse into their symptoms with as much violence as ever.

It may afford some light towards understanding the nature of this Poison, to observe that Apulia is the hottest part of all Italy, lying eastward, and having all the summer long but very little rain to temper the heats: so that the inhabitants breathe an air, as it were, out of a fiery furnace. Hence their temperament is dry and adust, as appears by their being generally lean, passionate, impatient, ready to action, quick-witted, very subject to inflammatory distempers, phrensies, melancholy, and the like: upon which account there are more mad people in this, than in all the other parts of Italy. Nay, what in other countries is but a light melancholy, arises here to a great height: for women in a chlorosis suffer almost the same symptoms as persons poisoned by the Tarantula do, and are cured the same way; and

in like manner the venom of the scorpion does here in its effects and cure agree very much with that of this spider.

From all this history it sufficiently appears, that those that are bitten by a Tarantula, do thereupon become delirious. In order therefore to account for the symptoms they suffer, it may not be improper to say something concerning a delirium.

Such is the constitution of the human œconomy, that as upon the impression of outward objects made upon the organs, and by the fluid of the nerves conveyed to the common sensory, different species are excited there, and represented to the mind; so likewise upon this representation, at the command of the mind, part of the same fluid is determined into the muscles, and, together with the arterial blood there, performs all the variety of voluntary motions and actions.

This order has been always so constant in us, that at length by a kind of natural habitude, without the intervention of the reasoning faculty, representations made to the mind immediately and necessarily produce suitable motions in the bodily organs. When therefore these representations are irregular, the actions consequent to them must necessarily be so too.

This being premised, it may perhaps be probably said, that a delirium is the representation and various composition of several species to the mind, without any order or coherence; together, at least most commonly, with irregular, or, as it were, undesigned motions of the body: that is, such a wandering and irregular motion of the nervous fluid, whereby several objects are represented to the mind, and upon this representation divers operations performed by the body; though those objects are not impressed upon the organs, nor those operations or motions deliberately commanded by the soul.

The mind indeed is the first principle of all muscular motion: but in such cases as these, its promptitude to action or habit being so great, it is in a manner surpris'd, and cannot recover itself, after the spirits are with violent force determined pursuant

to

to the representation of the species. For, as in the former state of things, a man is said to act rationally, so this latter case is called a perturbation of mind, that is, a delirium ; though it is very manifest, that in reality the defect is not in the rational, but corporeal part : such species being really presented to the mind, upon which by the order of our constitution such motions ought to follow in the body.

Thus, for instance, if the liquor of the nerves is, without the presence of any thing hurtful, put into a motion like unto that, which a painful impression makes in it ; the same bodily actions must ensue, as proceed from fear, anger, or the like passion, determining the spirits towards the muscular parts. And a by-stander, who sees no reason for such a representation made to the mind, will presently conclude, that the person thus acting acts without or beside his reason, that is, is delirious ; especially if the hurry and confusion of the spirits be such, that not only one, but several different species be at the same time presented to the mind : for a man in this case may act the part of one joyful, angry, timorous, or the like, without any appearing reason, and all this almost in the same moment of time.

In one word, deliria are the dreams of those who are awake. And as these in us sleeping are infinitely various and wonderfully compounded, and all from the same common cause, diversely pressing the orifices of the nerves, and thus making different repercussions of their fluid ; and as we all know that, in this confusion of representations to the mind, there hereupon follow (though the body seem now in perfect repose) such motions in the organs, as are usually the effect of the arbitrary determination of the spirits thither : so we are now to inquire, what alteration of the body, made by this venom, can be the occasion of this disorder and tumult in the nervous fluid, which excites in the party infected such surprising, and almost contradictory representations.

Most of the symptoms of those, who are bitten by the Tarantula, are at the first, that is, before they rise to a delirium, plainly the same with those which the bite of a Viper induces : without doubt therefore, as we have before observed of the common Spider, that it pierces the flesh with its hooked forceps, and at the same time instils from the proboscis in the mouth a liquid venom into the wound ; so the like claws in this^f serve to make way for an active and penetrating juice emitted from the same part.

This fiery drop (as in the case of other poisonous animals) puts the nervous liquor into a ferment : a fever ensues : the secretion of this fluid in the brain, and consequently its derivation into the organs, is irregular : the impressions of outward objects upon the spirits so inflamed affect too sensibly ; nay, without the action of these, in such a disturbed state of the œconomy, species or images are presented to the mind, which produce suitable, that is, irregular motions in the body.

More will be said to this purpose in the following Essay. For the present it may suffice to observe, that these representations and actions will generally be according to the temperament of the patient ; and the spirits will be hurried to those parts, to which in time of health they have been most frequently determined : and every one knows which these are in hot countries and constitutions.

It will perhaps make this theory probable, to consider that Baglivi^g, in the dissection of a rabbit, killed by a Tarantula, found the substance of the brain, near the origin of the nerves, lightly inflamed, with livid spots here and there ; a large quantity of extravasated serum upon the brain : the effect generally of the circulation of the blood stopped by a fault in the secretion of the nervous liquor.

As to the cure, which seems almost ridiculous, we must take notice, that the patients have no inclination to dance, till they

^f Vid. Tab. iii. Fig. 5.

^g Pag. 40.

hear the music : being desired to do it, they answer, it is impossible, they have no strength. Their starting up therefore, at the first noise of the instrument, is of a piece with their other actions : for as every thing from without has too great an effect on the nerves and their disordered fluid ; so sounds, which formerly were joined to this exercise, and encouraged it, now excite to it with fury and violence. And the benefit of it is, that the continued motions of the limbs produce large sweats, which, by carrying off the inflammatory particles, abate the fever raised in the animal spirits.

But besides this, we may perhaps allow somewhat to the determinate force and particular modulation of the trembling percussions of the air, made by the musical chords upon the elastic fibres in the brain : for contractile bodies may be acted upon by one certain degree of motion in the ambient fluid, though a greater degree of it, differently modified, may produce nothing of the like effect. This we see in the common experiment of two musical instruments, tuned both to the same pitch : the strings of the one being struck, the correspondent strings of the other will sound ; and yet a much greater motion of the air, otherwise agitated, will not cause any sensible vibration in the same chords. And also by a trick which some have, of finding the tone or note peculiarly belonging to any large wine-glass, and by adapting their voice exactly to that tone, and making it loud and lasting, they will make the vessel, first to tremble, and then burst : which it will not do, if their voice be but a little either too low or too high ^h.

Mr. Boyle relates a story, from Scaliger, of a knight of Gascony, whom the sound of a bag-pipe would unavoidably force to make water ; though this secretion is regularly made by the arbitrary contraction of the muscle of the bladder ⁱ.

^h Vid. Morhofii Stentor ΤΑΑΟΚΑΑΕΤΗΕ. Kilon. 1682.
and unheeded motions, chap. 6.

ⁱ Of languid

This makes it no difficult matter to conceive the reason, why different persons infected with this venom, require often for their cure a different kind of music: their fibres having different tensions, are not in like manner acted upon by the same vibrations.

The obstinate continuing of the patients in this exercise is, in a great measure, owing to the encouragement of the bystanders, and the strong opinion they have of being benefited by it.

Nor are we to wonder at this practice, as odd and irrational: for music was anciently very much made use of to medicinal purposes; and may without doubt do very great service, even by a mechanical force, in many bad distempers; particularly in some disorders of the mind, which being always attended with irregular hurries of the spirits, may be quieted by exciting in them such motions, as accompany the contrary passions.

It is plain from the history of king Saul, that this was known in very early days among the Jews. He being at times seized with fits of madness, was cured this way^k: for the evil spirit from the Lord, I suppose (according to the Jewish manner of expressing extraordinary incidents) means no more than a maniacal fury, which by divine judgment he at certain times fell into.

We have a famous testimony to this purpose in Galen^l, who tells us, “that Æsculapius used to recover those, in whom violent motions of the mind had induced a hot temperament of the body, by melody and songs.” Pindar^m mentions the same thing: and indeed from hence not only the notion, but the very name of charmingⁿ seems to have taken its origin.

Thus Athenæus relates, that Theophrastus in his book of Enthusiasm says: “Ischiadic pains are cured, if any one sooth (or

^k 1 Sam. chap. 16.
thior. Od. 3. μαλακαῖς ἰπαιδαῖς.

^l De Sanit. tuenda, lib. i. cap. 8.
Vid, ibid, Scholia.

^m Py-
ⁿ A carmine.
“charm);

“ charm) the part by Phrygian harmony °.” And in the like allusive sense Cælius Aurelianus calls this practice, *decantare loca dolentia* ; and then adds by way of explication, that “ the pain “ is mitigated and discuffed by the tremblings and palpitations “ of the part ”. Which seems very well to agree with what was before remarked, concerning the mechanical force of music upon the elastic fibres of the brain, whereby the spirits being determined to the parts affected excite those motions in them, which produce a cure. Besides, as Athenæus here intimates, the Phrygian music was upon a pipe, which was the most vehement and brisk of all the ancients knew ; so that indeed it was said to raise those, who heard it, to perfect fury and madness † : and such we have observed to be requisite for the venom of the Tarantula.

Aulus Gellius † not only relates this same cure of Ischiadic ails as a thing notorious enough ; but adds besides out of Theophrastus, “ that the music of a pipe rightly managed healed the “ bites of Vipers.”

And not only does Apollonius ‡ mention the cure of distractions of the mind, epilepsies, and several other distempers this same way ; but Democritus † in his treatise of Plagues taught, “ that the music of pipes was the medicine for many diseases ;” which Thales of Crete confirmed by his practice : for when sent for by the Lacedæmonians to remove from them the pestilence, he did it by the help of music †.

All which instances evince this remedy to have been very ancient in many cases. And indeed as Cælius Aurelianus * takes notice, that the first use of it was ascribed to Pythagoras him-

° Deipnosoph. lib. xiv. p. 624. Ἰσχυιανὸς φάσκων ἀνόσους διατελεῖν, εἰ καταυλήσῃ τις τῷ τόπῳ τῇ φρυγιστὶ ἀρμονίᾳ.

† Morb. chronic. lib. v. c. 1. Quæ cum saltum sumerent palpitando, discusso dolore, mitescerent.

‡ Vid. Bartholin. De tibiis veter. lib. i. c. 9.

† Noct. Atticar. lib. iv. c. 13.

‡ Hist. Mirabil.

† Apud Aul. Gell. loc. citat. Plurimis hominum morbis medicinam fuisse inentiones tibiæ.

‡ Plutarc. de Musica.

* Loc. ante cit.

self, so he having settled and founded his sect in those very parts of Italy, which are the country of the Tarantula, going then under the name of Græcia magna, now Calabria; it is not, I think, at all improbable, that he might have been the author and inventor of this practice there, which has continued ever since: especially since Jamblichus affirms^y, not only that he made use of music in physic, but particularly that he found out and contrived some harmonies to ease the passions of the mind, and others for the cure of bites.

To this useful power of music I will (to confirm my reasonings upon it) add a remarkable instance of its hurtful effects, even in a brute; which an ingenious gentleman told me he once saw. A player on a fiddle having frequently observed, that a dog in the room was always so affected by a particular note, as to howl, and shew great uneasiness at it; one day, for experiment's sake, continued to strike the same note so long, till the sensible animal fell into convulsions and died.

To conclude with the Tarantula, we may take notice, that, to the return of the symptoms the next year, that is owing to the same excessive heat in those months, acting again upon the small remains of the venomous ferment. Thus Bartholin^z relates a story of a melancholy physician at Venice, who suffered the attacks of his disease only during the Dog-days, which yearly ended and returned with them: a convincing proof how great a share heat has in all these cases.

^y De Vit. Pythagor. cap. 25. πρὸς ἀγγυὲς βοηθητικώτατα μέλη.
Anatom. Cent. 2. H. 16.

^z Histor.

E S S A Y III.

OF THE MAD DOG.

THE terrible effects of the Poison from the bite of a Mad Dog, appear after so different a manner in different subjects, that the accounts given of them by authors, being generally taken from single cases, are very different, and hardly consistent with one another. The main symptom indeed they all agree in, that is, what they call (though improperly) the hydrophobia, or dread of water : but the disorders, with which this is attended, are related so variously, that they can scarcely be thought to belong to the same kind of malady.

I shall therefore first describe the history of this disease, from observations made on a considerable number of patients ; and then inquire into the reasons, why the fatal distemper commonly produced by it shews itself with so much variety, and appears, as it were, disguised in some cases.

The wound from the bite of a Mad Dog differs not at all from that made by a common bite, and is as easily healed : and it is usually a considerable time before any bad consequences of it appear. There are instances where these have been deferred to three, four, or six months ; nay, some authors say, to a year and longer. Galen himself saw one case after a year^a ; I remember one after eleven months : but the attack is generally

^a Comment. ii. in 1 Prorrhet. Hippocrat.

within thirty or forty days, though very often sooner, sometimes in fifteen or sixteen days, in young subjects.

The first approaches of the distemper generally discover themselves after this manner. A pain is felt in the part which was wounded, which by degrees spreads itself to the neighbouring parts: a lassitude follows with uneasiness in all the limbs. Then the patient grows pensive and sad, with disturbed and unquiet sleeps, complains of faintness and lowness of spirits, particularly of an oppression at his breast. His pulse intermits, his nerves tremble, he has cold sweats, a great nausea and sickness at stomach, and loaths food: and though he has an inward heat and thirst, and desires to drink; yet he swallows meat, but especially liquors, with great difficulty. These symptoms increase, and the next day, from the great uneasiness and pain, which he finds in swallowing, he conceives such an aversion to liquids, that at the first sight of them he falls into convulsions and agonies, and cannot get down the least drop. This hydrophobia has always been accounted the surest sign and mark of this Poison, by which it is distinguished from all other diseases; as not being observed, at least very rarely, in any other case whatsoever.

At this time a fever usually appears, with a quick but low pulse, without the least sleep, a hoarse voice, a gathering of froth in the mouth, and spitting out of this upon the by-standers; universal convulsions, particularly about the throat, and in the muscoli erectores penis, whence a continued priapism is observed. During this tragical scene, which always proves fatal in about two days, a delirium comes on, sometimes with most terrible symptoms of rage and fury, and attempts of doing all possible mischief even to the most beloved friends and relations; but more commonly without any furor, it is of the melancholy kind, and the wretch resigns to death, and prepares for it, bids those about him take care of themselves, lest he should do them a mischief; and begs that they would trouble him no
more:

more : and, his breath growing shorter and shorter, he expires in convulsive fits.

Many of the ancients have mentioned this disease, particularly Dioscorides, Galen, Ætius, Ægineta; but none have described it so largely as Cælius Aurelianus^b, who, from the writings of the Greek physicians, (chiefly Soranus, of the methodic sect) has collected, and put into obscure bad Latin, all the symptoms of it, with great pains and exactness. The names of the more modern authors on this subject may be seen collected by that diligent observer, Stalpart Vander Wiel^c, to which may be added the learned Dr. Lister^d.

It will afford great light towards the knowledge of the nature of this abstruse disease, to remark some odd appearances in the progress of it: which, though with a little variety, discover themselves in a greater or lesser degree in all the unhappy patients.

It is common to them all, that they can ill bear the impression of objects upon the senses. All feeling is painful. The slightest touch or rubbing of the limbs hurts. The least noise is offensive : and the opening or shutting of a door affrights, as if the house was falling. The eyes so ill bear the light, that even the sight of any thing white is intolerable. In like manner, the inward membranes are so tender, that they cannot suffer their natural sensation. The common coolness of fresh air is disagreeable to the lungs : and the making of water gives uneasiness and grief in the urinary passages. The aspect is dismal, either frightful with tokens of rage and fury, or lamentable with marks of moaning and despair. There is no sleep from the beginning of the fever to the end.

When the symptoms are maniacal, the strength of the muscles is prodigious : these acting indeed with a convulsive force so great, that I have seen a case, in which a man tied down in bed.

^b De morbis acutis, lib. iii.

^c Observat. rarior. Cent. i. Obs. 100.

^d Exercit. Medicinal.

with strong cords broke them all at once by one effort, and immediately died paralytic ; as if all the fibres of the body had been over-strained, and torn to pieces by their violent action.

As to the hydrophobia, the patient at first has no dread of water, nor any aversion to liquors. On the contrary, he sees them with pleasure : being thirsty he desires drink ; but then soon wonders, what should be the reason, that he is not able to take it. He contrives ways to do it, by endeavouring to suck through a quill, &c. but soon cries out : It is impossible. When asked why, he answers : It will not go down, it strangles him, and begs to be excused trying any more.

In order to find out the cause of this train of dreadful events, we must take notice, that the rabies or madness in a Dog is the effect of a violent fever ; and therefore it is most common in excessive hot weather, though sometimes intense cold may be the cause of it : that no Dog ever sweats ; from whence it follows, that when his blood is in a ferment, it cannot, as in other creatures, discharge itself upon the surface of the body ; and therefore must of necessity throw out a great many saline and active particles upon those parts, where there is the most constant and easy secretion : and such, next to the milary in the skin in us, are the salival glands. For this reason much more spittle is separated in a Dog, when mad, than at any other time, and that very frothy, or impregnated with hot subtile parts.

The looks of a Dog in this condition discover a fever. He runs wildly forward panting, snaps at every one he meets : his tongue hangs out of his mouth with flabber : his eyes are heavy, full of tears : he takes no food nor drink. In dissecting one, who died mad, the forepart of the dura mater on the brain, about an inch above the eye-brows, was found inflamed and even ulcerated, the ulcerations piercing through this membrane, and also the pia mater : and upon pressure there issued out from the small ulcers a thin matter tinged with blood.

Now

Now as we every day observe, that what is thrown out from liquors in a ferment, is capable of inducing the like motion in another liquor of the same kind, when duly mixed with it; so we may very well suppose in the present case, that the saliva, which is itself one of the most fermentative juices in nature, being turgid with fiery saline particles thrown into it out of the boiling blood, when it comes by means of a wound to be mixed with the nervous liquor in another animal, must necessarily put it into violent agitations, in the nature of a ferment, (as has been explained in the Introduction :) the consequence of which will be, all the effects of an interrupted secretion in the brain, and disturbed circulation of the blood, a fever with a delirium, convulsions, &c.

That this delirium is sometimes maniacal, sometimes melancholic, is owing to the different temperament and constitution of the patient, inclined more to passions of one kind or the other. As we see the effects of drunkenness are in one man good humour, mirth, and joy; in another, ill-nature, malice, and rage; in a third, a mixture of ridiculous and extravagant actions: and all from the same common cause, raising natural dispositions to a higher pitch. And we must likewise observe, that the huntsmen distinguish in Dogs themselves two kinds of this disease, one of which they call the biting, the other, the sullen madness.

In short, this distemper is a fever of that kind, in which the nervous fluid is more particularly affected, from the violent action of an extraneous fiery matter mixed with it. A delirium ensues, attended, according to the disposition of the body, with symptoms either of fury or of despondency, and very often with a mixture of both. For we know that these are frequently changed, and succeed to each other: a mania being indeed usually a heightened melancholy; that is, from great and continued lowness of spirits, apprehensions of evil increase more and more, and the imagination is possessed with species of things most terrible

and destructive : upon which the mind is necessarily determined to actions, which by the constant order of nature follow upon such representations. And we therefore find, that, even in common fevers, patients will sometimes give warning of their growing furious : that is, of their perception of frightful images, which will of course unavoidably hurry the mind to outrageous efforts.

But the hydrophobia (though it is commonly thought to be so) is no part of this delirium : as will appear anon.

From the description we have given, it may, I think, be concluded, that there is in all these cases some degree of inflammation, with too great a tension and driness of the nervous membranes, and too much elasticity and force in the fluid, with which they are filled : that by this they have acquired a preternatural sensibility ; so that the usual impressions of outward objects, instead of an agreeable feeling, give pain and uneasiness ; and inward images are so strong and lively, that the mind is surpris'd, and determines the spirits into the muscular organs with an irregular impetus.

As a proof of this, the dissection of the dead bodies generally discover the vessels in the brain distended, the sinus longitudinalis full of fluid blood, not coagulated, as is usual in most other diseases of the head : the brain itself, and the spinal marrow, drier than ordinary : the pericardium without liquor : the lungs loaded : the arteries full of blood, very fluid and hardly con-
 crescible in the open air : appearances all, which shew the animal spirits to have been principally affected.

The hydrophobia, we said, is no part of the delirium. For the patients, being feverish and thirsty, do always desire drink, as long as they can swallow it : at last they find they can neither eat nor drink, but drinking is the most difficult. Now the reason is this. This fever is of the nervous or spasmodic kind : all the nerves are drawn into cramps ; particularly the muscles employed in deglutition are convulsed, their action is lost, and it

is then impossible to get any thing down. To ask one in this condition to drink, is to desire him to choak himself: and when he has found this to be so, he dreads the sight of liquors offered to him, as much as he would a knife presented to his throat, and strives to keep them from his mouth. Liquids in such a state are swallowed with more difficulty than solids: because the instruments of deglutition (which are principally, the back part of the tongue, the hinder part of the palate, and the upper part of the œsophagus) can more effectually embrace and act with their joint force upon solid, than upon liquid substances. And besides this, the epiglottis (which must always be closely shut at this time) is more powerfully pressed down by a solid, than by a liquid body. When therefore the united force of these parts is taken away by convulsions, some part of the liquids will slide down into the aspera arteria: upon which a suffocation must immediately follow. This disease therefore should have been called *Δυσκατάποσις*, a difficulty in swallowing; rather than *Ὑδροφοβία*, a dread of water.

It will serve both to illustrate and confirm this reasoning, to take notice, that there are other distempers besides this, (and all indeed of the nervous kind) in which the same frightful symptom is sometimes observed. Authors ^e have remarked it in malignant fevers: and a common melancholy has been seen to end fatally in it ^f. I have known it, in the height of a violent hysteric disorder, to have continued for many hours, till the convulsive motions in the throat were quieted by proper medicines: and I remember a case, in which fits of a palpitation of the heart were attended with so great a degree of it, that it seemed not to differ from the true hydrophobia.

On the other hand, it has sometimes happened, that this bite has been followed with all the other usual symptoms, even to a fatal degree, and yet no hydrophobia has appeared. A learned

^e Schenckius de Venen. Animal. Salmuth. Observ. Cent. ii. Obs. 52.
mer. German. ann. 1687.

^f Ephe-

physician has assured me, that in Shropshire he saw three patients in one year, who, at the ordinary time of about thirty or forty days after the wound, all fell into such nervous disorders as have been described, a fever, delirium, oppression of the breath, palpitation of the heart, spasms, &c. and died on the third day: yet none of them, during this melancholy scene, had any difficulty of swallowing, or shewed any signs of a dread of liquids.

The hydrophobia therefore is only a local convulsion, which, when the universal feverish affection of the nervous system is come to the height, is very seldom absent: but though it be, the spasms of all the other parts may prove mortal. And because this fever of the spirits is rarely so violent in any cases, except the bite of a Mad Dog, as to produce a difficulty of swallowing; this symptom has been thought to be peculiar to that Poison.

Nothing seems more wonderful in this whole affair, than that the venom should as it were lie latent in the body so long a time, before it discovers itself. Now if, as has been said, the poisonous saliva acts upon the nervous fluid in the manner of a ferment, it may well be conceived, that before this can have a sensible effect, it must make some alteration in the more solid fibres of the brain, by inducing perhaps that tension and driness of the membranes, which we have mentioned. This in different constitutions will be done in a different space of time: nay it may so happen, that this ferment being weak, and the constitution strong, no visible mischief may ensue, till some accidental alteration in the body unluckily gives it an additional force: as we observed in the case of the Tarantula, how far external heat promotes the delirium.

And therefore, by parity of reason, the calamitous symptoms may sometimes, by the concurrence of extraordinary circumstances, be unexpectedly brought on in less time than any above-mentioned.

We

We experience every day in common nervous distempers, that the return and violence of the fits depend very much upon the action of things both within and without. We may add to this, that in some diseases, in which the blood itself is infected, and the solid parts, even the bones, corrupted, the Poison seems to be hid a considerable time, while it is working in the body, before its last effect appears : as particularly in venereal cases.

Neither will it seem strange, that a Poison so different in its force, and so alterable by many circumstances, should in some subjects produce symptoms of the same convulsive kind, yet not to such a degree as to hinder deglutition : and these too only at particular times.

A soldier of a strong habit of body came to me not long since, who once a month was seized with a great anxiety, palpitation of the heart, and difficulty of breathing. He had been bitten by a Mad Dog about six weeks before he began to complain. By bleeding, cold bathing, the powder of lichen with pepper, and volatile medicines during the oppression, the fits were every month less violent, and at last quite left him.

A most remarkable case of this kind was communicated to me by a person of unquestioned veracity. It was this. A gentlewoman in Yorkshire, of the age of thirty-five years, was bit by a Mad Dog in the fore-finger : about a month after, she had a pain in that part, which shot up to the shoulder, and was thought to be rheumatic. This pain returned every month, just a day before the full moon, lasting generally three days. After fifteen months she fell into the hydrophobia, and died the third day. Her friends then recollected the bite to have happened so long before.

The influence of the moon in these cases I am convinced is of some weight. The manner of its action I have attempted to explain in another place[§] : and as the proofs there given are

§ De imperio solis ac lunæ.

undeniable, and very much regard the nervous fluid; it cannot be doubted, but the same power may have the like effect in a disease, in which this fluid suffers more remarkably perhaps than in any other whatsoever.

Looking over the histories of the many patients I have attended in this deplorable condition, I observe about one half of the number to have been attacked with the spasms preceding the hydrophobia, either upon the full moon, or the day before it. And where this is only an influence concurring with inward causes of great force, it is not to be expected, but that those should often prevail without this external assistance.

But it is time to come to the cure, or rather the means of preventing the effects of this terrible Poison. For all authors agree, that, after the appearance of the hydrophobia, the case is almost desperate: and the reason is plain from the description we have given of it, a dismal scene of the last struggles and agonies of nature yielding up to the enemy.

The first care to be taken is of the wounded part. The ancient physicians^h, who are followed in this by the modernsⁱ, advise, where the place will admit of it, to enlarge the wound by incision; to apply a cupping glass; to burn it with a hot iron; and to keep a discharge from the ulcer by drawing medicines for many days.

I cannot but say, that I think all this severity needless. The design of it is to draw out the Poison: but as it has been proved, that this immediately affects the nervous liquor, the mischief must have taken place, before applications of this kind can be made.

I therefore am of opinion, (because it may however be of some service to have a continued drain from the part) that it will be sufficient to enlarge the wound a little, and dress it with

^h Vid. Galen. de Ther. ad Pis. l. i. c. 16. & Ætium l. vi. c. 24. & Celsus, l. v. c. 27.

ⁱ Hildan. Obs. Cent. i. Obs. 87.

Ung. Basilic. nig. adding to it a small quantity of Mercur. præcip. rub. as a digestive.

It happens in most cases, that the wound being small, is healed up before the patient seeks for help. For this reason, and because it is of no great consequence whether it be cured or not, in the paper which I printed and dispersed some years since, intitled, A certain cure for the bite of a Mad Dog, I took no notice of any outward application: the rather, because I thought, if any great stress was laid upon it, it might frighten those who had neglected this care; and lead them to think, that the other part of the cure would not be effectual without it. And I can safely affirm, that (whether any outward application was made or not) I have never known this method to fail of success, where it has been followed before the hydrophobia began: although in the course of about thirty years (besides the experience made by others, both in town and country) I have used it a thousand times. I have often wished, that I knew so certain a remedy in any other disease: I shall therefore give the reasons of this method.

But before I proceed to the particulars of it, it may not be amiss to mention the most considerable medicines, which have been formerly used in this case: for it will hence appear, that the like intentions have been pursued in all times, though by different ways.

The injudicious jumbles of Theriaca's, specific antidotes, &c. whether old or new, deserve no notice. That ridiculous preservative, the liver of the Mad Dog, which Pliny says *, should be eaten rather raw than boiled, is neither good food nor physic. Galen ¹ observed, that it availed nothing: and I remember to have seen a poor boy die mad, who had greedily devoured almost the whole of it.

* Hist. nat. l. xxix. c. 5.

¹ De simpl. med. facult. l. ii. c. i.

There are two or three remedies recommended, I think, upon rational grounds. The first is the *Cineres cancrorum fluvatilium*, ashes of the river craw-fish. These were prepared by burning the fish alive upon a copper-plate, with a fire made of the cuttings of twigs of the white briony. This Galen^m avers that no body ever made use of without success: and before him Dioscoridesⁿ assured, that it is a medicine which might be relied on. This calcined powder was given in large quantities, viz. a good spoonful or two every day for forty days together; either alone, or rather mixed with a small portion of gentian root and frankincense.

Another medicine is the *Spongia Cynorrhodi*, vel *Rosæ sylvestris*, the sponge of the dog-rose, which is so celebrated an antidote against this and other animal poisons, that P. Boccone^o, who has written a whole discourse upon its virtues, tells us, it is called in Sicily, *Sanatodos*, or all-heal.

Besides these, the plant *alyssum* or madwort had its name given it by the ancients, from its great efficacy against this madness. This was of two sorts, one described by Dioscorides, a species of the *Leucoium*, the other by Galen, a *Marrubium*^p. To these may be added garlick, agrimony, and oxylapathum.

Now it is remarkable, that all these remedies are powerful diuretics; the two first of the animal, the last of the vegetable kind. For, as Mr. Ray^q has observed, the sponge of the *Cynorrhodon* is an excrescence formed upon the plant, as galls are upon the oak. If it be cut, 'tis found full of white worms, being the nest of these insects; which lodging here all the winter, do in the beginning of the spring turn to flies and quit their quarters.

All insects abound with a diuretic salt: but as *Cantharides* do so more than any others, therefore the learned Baccius^r goes

^m De simpl. med. facult. l. iii. c. 34.
di piante rare, Obs. 2.
Plant. tom. ii. p. 1471.

ⁿ De Theriac. c. 2.
^p Vid. Fab. Column. Phytobasan. p. 27.
^r De Venen. p. 89.

^o Museo
^q Hist.

farther, and, from the authority of Rhazes and Joannes Damascenus, advises to give these in substance for many days together. The preparation of this antidote (so he calls it) is by infusing the flies in four butter-milk twenty-four hours, then drying them, and with the flour of lentils and wine making them up into troches of a scruple weight, of which one is to be taken every day: by which means he assures us, that though the patient make bloody urine, yet that milk largely drank will abate that symptom, and that the Hydrophobia will be happily prevented. Boccone likewise informs us, that in Upper Hungary they give in this case five Cantharides in one dose to men, and to beasts a greater quantity^s.

I must add, that Ætius^t, who has collected all the medicines he could from the old physicians, affirms, that himself knew an old man, who cured those, who were bit, with common sorrel only. He washed the wound with a decoction of this herb, and laid it on as a cataplasm, and gave it in drink: by this means, the patient made a great quantity of turbid urine.

From hence it appears, that the surest remedies in all ages against this venom have been such, as provoke a great discharge by urine. Reflecting upon this, I thought it must be right to give to the public a course easily to be pursued, which by preventing the fever for a long time after the bite, and constantly promoting this evacuation, might secure the patient from danger. The method is this.

“ Let the patient be blooded at the arm nine or ten ounces.
 “ Take of the herb, called in Latin *Lichen cinereus terrestris*,
 “ in English Ash-coloured ground liverwort, cleaned, dried, and
 “ powdered, half an ounce. Of black pepper powdered, two
 “ drachms. Mix these well together, and divide the powder
 “ into four doses, one of which must be taken every morning,

^s Museo di fisica. Observ. 21. ^t Lib. vi. c. 24.

“ fasting, for four mornings successively, in half a pint of cow’s
 “ milk warm. After these four doses are taken, the patient
 “ must go into the cold bath, or a cold spring, or river, every
 “ morning fasting, for a month: he must be dipt all over, but
 “ not stay in (with his head above water) longer than half a
 “ minute, if the water be very cold. After this he must go
 “ in three times a week for a fortnight longer.”

This powder was first published in the Philosophical Transactions *, from Mr. Dampier, in whose family it had been kept as a secret many years: and in the year 1721, it was, at my desire, put into the Pharmacop. Lond. by the name of Pulvis antilyssus. I afterwards made this alteration only, of putting two parts of Lichen to one of pepper, instead of equal parts, because I thought it too hot: and whereas but two or three doses of it were formerly given, I repeated it four days.

The Lichen, like those already mentioned, is a warm diuretic; the pepper is added, I suppose, to make it more agreeable to the stomach: for it is distasteful and nauseous.

This plant * is so remarkable for its virtue, that it may not be amiss to give a description of it.

Mr. Ray, so far as I can find, was the first who gave a distinct account of it †, reckoning it among the Lichens. Our great botanist, Dr. Dillenius, has lately more exactly described it ‡, and put it into the tribe of the mosses, calling it *Lichenoides digitatum cinereum, Lactucæ foliis sinuosis*. It appears indeed to be of a substance between a fungus and a muscus, soft, spongy and lanuginous. It grows close to the ground, chiefly on heaths, and in woody, shady places, near the roots and stumps of trees; which being commonly covered with creeping, mossy herbs, it sticks to them when it is gathered.

* N° 237.
 1670, & Hist. Plant.

† Vid. Tab. iv.

‡ Vid. Catal. Plant. Angl. ann.
 * Hist. Muscorum, pag. 200.

It is found in all countries, and from America has been observed to be brought over with the Peruvian bark.

The leaves when young are small, but grow to two or three inches in length, and an inch or two in breadth, divided into several segments. They are sometimes single, sometimes lying upon one another. At their extremities they produce little hard, oblong bodies, which the botanists call Peltæ, and are undoubtedly the seminal capsulæ. The leaves, when dry, are ash-coloured, darker on the upper part; on the under, lighter. Frequent veins are observed along them, from which here and there run small white fibres into the earth, the roots of the plant.

It is found at all times of the year, especially after rainy seasons, that is, from autumn to winter: and therefore, as being in its freest vigour, it should always be gathered about that time.

I have also examined it by distillation; by which four ounces of it yielded, of an acid water one ounce, five drachms, one scruple, and two grains; of oil heavier than water, two drachms, one scruple, sixteen grains; of coal containing fixt salt, one ounce, two drachms, one scruple, eleven grains.

But I proceed in the cure. To make this more effectual, I added the use of cold bathing, which had never been recommended in this manner before. The ancients, as I shall observe presently, never applied it till the Hydrophobia appeared; and the common practice among us of sending the patient to the nearest salt-water, as soon as may be, and there only to dip him all over twice or thrice, it is plain, cannot avail much to the prevention of a disease, which will not appear till about a month after; and therefore it ought to be continued for so long a time, if any advantage is to be expected from it: and I have indeed known many to have died raving, who had undergone this treatment. It is the pressure of the water upon the surface of the body, and the constriction the cold makes upon the fibres of

the skin and the small tubes, which produce the good effect. The distension of the vessels by the fermenting humours is hereby repressed, and a flux of urine promoted for so many days, that all danger of the nervous fever, the consequent of the instilled Poison, is quite over. And if it should be thought that salt-water, being heavier than fresh, will press more; this difference, in two or three immersions only, can be but of small moment, and is abundantly compensated by the greater coldness of springs (which are usually chosen for this purpose) than is felt in the sea.

Thus I have made plunging into water effectual in preventing this disease, without the danger of drowning: whereas the ancients practised the same to remove it when it appeared, with some degree at least of this hazard. For Celsus^a, who seems first to have mentioned it, and says it is the only remedy, advises, if the patient can't swim, to let him be kept under water, that he may swallow it; and then at times be lifted out of it: if he can swim, to hold him under by force, that he may drink whether he will or not. This in short is drowning and recovering by turns. And I make no question, but so bold a practice was grounded on the authority of the Greek physicians, from whose rich stores this Latin author has extracted, and digested into a small compass, the best system that ever was composed of medicine.

However it be, the famous Van Helmont^b, in the beginning of the last century, having observed the great effects of this practice in Flanders, recommended it in a very strong manner. He saw an old man in the Hydrophobia, cured by submersion in

^a Unicum remedium est, nec opinantem in piscinam non ante ei provisam projicere, &, si natandi scientiam non habet, modò mersum bibere pati, modò attollere; si habet, interdum deprimere, ut invitus quoque aqua satietur: sic enim simul & sitis, & aquæ metus tollitur. Lib. v. cap. 27.

^b Ortus Medicin. Demens idea.

salt-water. He was first held under the water about four minutes, then taken out, and dipped again twice more, each time about a minute. When he was taken out, he really thought him quite dead; but being kept warm, and laid over a barrel, he vomited up the water he had swallowed, and recovered both his life and right senses.

He relates another remarkable story of the cure of the common mania, by being drowned in fresh water; and from this rightly concludes, that it makes no difference in the case, whether the water be salt or fresh. He justly remarks, that great care should be taken not to give over for dead those who are drowned: adding two remarkable instances of persons who were brought to life, after they had lain under water half an hour. And to this purpose I remember, that an ingenious physician told me, that he had, not long since, in the country, happened to save a man from the grave, who having been sunk in a river more than twenty minutes, was judged to be past all hopes of recovery.

There are many accounts upon record of those, who after having been drowned many hours have been brought to life^c. This should certainly encourage the use of all means upon such accidents, especially since the trial is not difficult. The first step should be, to blow up the smoak of tobacco into the intestines: then to warm the body by shaking and rolling it about, and rubbing it with warm cloaths in bed: in a word, to put the blood into motion by all manner of ways; and not to be discouraged, though no signs of life should be discovered after an hour or two spent in this good work: towards the latter end of which volatile spirits and salts may have a good effect. Neither should bleeding be omitted, when the blood is become warm enough to drop out of the veins.

^c Vid. Dissertation sur l'Incertitude des signes de la mort. Paris, 1742.

But to return from this (I think useful) digression to the Hydrophobia, I must observe, that if submersion in this way be put in practice, it ought to be done upon the very first signs of the symptom, before the fever is come to its height. For when it is so, there will not be natural strength to overcome the shock: and I have always found, that at this time even common bathing has proved hurtful.

But experiments of this kind are perhaps rather to be permitted than enjoined by physicians, for their own sakes; though it is certain, that cures more dangerous than this are every day directed: but that is generally in cases, where it cannot so evidently be known, whether the patient dies by the remedy or by the disease. In such kind of attempts, the danger from the trial is to be weighed against that from the disease: if this out-weighs, it is not only reasonable but merciful, “even with a kind of rashness, as Celsus somewhere expresses it, to snatch an opportunity of doing good^d.”

At least there is more humanity in such proceeding, than in stifling a miserable wretch between two feather-beds: which, as I have been informed, is the practice in a neighbouring country, and sometimes in our own.

But the greatest comfort is, that at any time before this scene of horror opens, simple immersion without drowning will prove effectual. For though it is best to begin the method prescribed, as soon after the accident as it can be done; yet where it has been neglected, even till a day or two before the calamity might be expected, (as was judged from the beginning anxiety and oppression of the spirits) the success has been the same.

Before I quit this subject, I must take notice, (as I have hinted from Van Helmont) that this action of cold water upon the body, by pressure and constriction, makes it of singular service in the

^d Cum quadam temeritate medicamenta arripere oportet.

cure not only of acute, but also of chronical deliria. Doctor Willis ^c relates a very remarkable story of a lusty young woman, who, having been raving mad seven or eight days, was by his order carried abroad at midnight, and thrown naked into a river, where she swam about without help for more than a quarter of an hour; and taken out was put to bed, fell into a sleep and large sweats, and recovered without the help of any other remedy.

But there is no need of instances of this kind. Our physicians, who are most conversant in the cure of these maladies, find by daily experience, that this practice has a very considerable share not only in recovering their patients, but also in preventing a relapse into the same misery.

I am therefore sorry to read in the Philosophical Transactions^f, a remark of a learned gentleman, who, upon my recommending cold bathing, proposes rather the use of the hot bath: because “a cold bath, he says, shuts the pores, as a warm one “opens them.” Surely he should have known, that the shutting of the pores by a short cold immersion, is naturally followed by a glowing warmth, which relaxes and opens them; and by this means promotes perspiration, without the distension of the vessels by an inflammatory heat. I am afraid no bathing, whether hot or cold, would clear a head possessed with such immechanical notions.

To say no more, whoever has rightly considered the Bellinian theory of melancholy and maniacal distempers^g, will easily see the reason of the surprising effects of this safe and easy application, in dispelling the greatest calamity, to which mankind is liable.

As to all other ways of curing the Hydrophobia, I own I have not been so happy as to find any success from the many I

^c De Anima brutorum, part. partholog. cap. x. de delirio & phrenitide. ^f N^o 443. ^g Vid. Bellin. De morbis capitis,

have tried. Bathing, at this time, is ineffectual. I have taken away large quantities of blood; have given opiates every three or four hours; tried volatile salts, *assa foetida*, the *rad. valerian. sylv.* with other antiepileptics, in large doses; as also the famous Indian remedy, musk and cinnabar; laid on blistering plaisters; cooled with nitre and emulsions of barley-water, &c. All has been in vain, because too late. And what is still more discouraging is, that though sometimes I have conquered the terrible symptom, and brought the patient to drink freely; yet he has died in twenty-four hours with a fever and convulsions: a plain proof of what we have said of the manner, in which this Poison operates.

However, nothing is to be omitted to the last, be the prospect never so bad: because that may succeed in one patient, which has not in a hundred. I have by me a letter from the learned Dr. Boerhaave, in which, with his usual exactness and judgment, he relates two cases of the Hydrophobia. In the first, according to the method mentioned in the History of the Royal Academy at Paris ^b, he ordered buckets of cold water to be poured, for a considerable time, upon the patient's head; and a clyster, of warm water, oxymel simplex, and sea-salt, to be injected every four hours. By these means he was brought to drink freely of small beer, and a decoction of marsh-mallow leaves, elder-flowers, and tamarinds: but notwithstanding these hopes, he died convulsed, yet calm and in his senses, in a few hours.

The other case had a more happy event: for though the dread of liquids was attended with foaming, roaring, and the most mischievous rage; yet by large doses of nitre, (to which laudanum and diacodium were sometimes added); by cooling the head continually with vinegar and rose-water; bathing the

^b Ann. 1699, pag. 49.

feet for one hour, every night and morning, in warm water and vinegar, with salt; keeping the body open by tamarinds, syrup of violets, and frequent clysters of water and nitre; and lastly, eating almost constantly lemons with a little sugar; the poor wretch was most perfectly recovered.

But I must here observe, that the use of all these things was entered upon four days before the dread of water began ; by which means the violence of the disease was, without doubt, very much abated : and I have great reason to believe, from what I have experienced, (as I have already said) that the method, I have recommended, would at that time even have prevented the calamity.

To conclude, if any relief could be expected in this desperate state, I think it would be from large bleeding, even ad animi deliquium, before the fibres of the membranes and vessels have lost their natural force by convulsions; nitrous medicines; and plentiful diluting with cooling subacid liquors. But after all, it will generally happen, that (as the Greeks said upon deplorable cases) "Death will be the physician that cures."

ⁱ Ἰατρὸς ἰᾶται θάνατον.

ESSAY IV.

OF POISONOUS MINERALS AND PLANTS.

THOUGH there be a great variety of internal Poisons, as well mineral as vegetable, yet they all manifestly agree in their primary effects and manner of operation ; which (as is explained in the Introduction) are somewhat analogous to the mischief from venomous bites or stings : the main difference lying in this, that in the one wounds are made outwardly, in the other inwardly, that is, in the stomach and bowels ; but in both cases, the animal œconomy suffers in much the same way.

“ Poisonous medicines, says Dioscorides, are many ; but the alterations made by them in the body common, and but few ^a.”

Of all this kind, those of a mineral nature are the most violent and deadly, the greater gravity and solidity of their parts giving to these a force and action surpassing the mischief of vegetable juices. And therefore whereas noxious plants vary their effects in different creatures, so as to prove harmless, nay perhaps beneficial and nutritive to some, as we have before observed ^b ; the strength of the stomach in these animals being

^a Ποικίλα μὲν γὰρ τὰ δηλητήρια φάρμακα, Κοινὰ δὲ καὶ ὁ πολλὰ αἱ ἐξ αὐτῶν γινόμεναι διαθέσεις.
Alexiph. p. 399.

^b See the Introduction.

sufficient to conquer and divide such corrosive substances, and their blood perhaps requiring to be recruited by such warm and active particles; a mineral malignity is not, at least so far as we know, conquerable by any, but becomes universally hurtful and destructive.

We shall here give the first place to Mercury sublimate.

This is nothing but a mixture of quicksilver with common salt. For, though it is always prepared with nitre and vitriol added to the salt, in different ways, the best of which is that described by Tachenius^c; yet neither of these enter into the composition, serving only to facilitate the work; (which they do by uniting with the alkaline parts of the salt, and thus freeing its acid from them :) as abundantly appears from this experiment, that Mercury sublimed with the same proportion of nitre and vitriol, without salt, neither receives any increase of its weight, nor acquires any malignant quality.

The effects of this Poison, when taken, are violent griping pains, with a distension of the belly; vomiting of a slimy, frothy matter, sometimes mixed with blood, and stools of the same; an intolerable heat and thirst, with cold sweats, tremblings, convulsions, &c. as will appear from the following history^d.

To a large dog was given a drachm of Mercury sublimate, mixt with a little bread. Within a quarter of an hour he fell into terrible vomitings, casting up frequently a viscid, frothy mucus, every time more and more bloody, and purged the same downward: till tired and spent with this hard service, he lay down quietly as it were to sleep, but died the next morning.

The abdomen being opened, a great quantity of extravasated blood was found between the liver and stomach, and between the duplicature of the omentum about the stomach; the guts as well as the stomach were distended, and full of a frothy

^c Hippocrates chymic. cap. xxiv.

^d Wepfer De cicut. aquatic. pag. 300.

bloody mucus : on the outside they were of a livid colour, within all over red, and inflamed down to the very rectum. The fibrous coat of the stomach being taken off, between that and the nervous one, grumous blood was found in several places : the like was discovered here and there in the intestines between the same coats.

The same symptoms with these, and manifest signs of a burning corrosion followed with ulcers in the bowels, Baccius^c observed in a young man poisoned by sublimate, mixt with his meat.

What we are here chiefly to examine is, how from ingredients singly innocent and harmless, so mischievous a compound can result : for as the case is very plain with respect to salt, so is it likewise now notorious enough, that quick-silver itself, which the ancients, Dioscorides, Galen, Pliny, &c. have unjustly ranked among Poisons, is in many diseases, inwardly taken, of very safe and beneficial use ; and that not only when disguised with sulphur, sugar, &c. but crude, without any correction, or vainly pretended mortification.

This the Arabian physicians first gave the hint of : Avicen^f having observed, that “ they, who drink it in a large quantity, “ receive no hurt ; its weight making a free passage through “ the body.” This was encouragement enough for the practice of giving whole pounds of it in the Iliac passion : which is oftentimes done with good success, without any frightful symptom accompanying the advantage received from its ponderosity.

Afterwards it plainly appeared that this mineral, either applied outwardly, or taken inwardly, though not in so great a dose as could immediately force its way through the intestines, even when it was lodged for some time in this or that part, was not at all hurtful by any corrosive or malignant quality.

^c De Venen. pag. 21.
plurimum qui bibunt, non læduntur eo : egreditur enim cum dispositione sua per inferiorem regionem.

^f Can. Medic. l. iv. Fen. 6. Argentum vivum

I remember, that I once found some quantity of it in the perinæum of a subject taken from the gallows for a dissection, (whose rotten bones discovered what disease had required the use of it, and that, I suppose, by unction) without any marks of corrosion of the part, where it was collected.

And Fallopius^g, Brasavolus^h, with others of great note, confirmed its harmless efficacy in the cure of the worms, not only in adult persons, but even in the more tender constitutions of children.

Nor are these the only cases, in which good service may be had from this weighty fluid. He that rightly considers the state of the animal œconomy, the various alterations it suffers from the stagnation of its more viscid juices in the smallest canals, and how much the impulse and force of the circulating blood, by which obstructions are to be removed, must be increased by its carrying along with it such particles as the mercurial globuli; will perhaps see good reason to allow, that the prudent management of quick-silver may do that in some obstinate and dangerous diseases, which we cannot promise ourselves from any other of our known medicines whatsoever.

But I shall not enlarge upon this head. The learned Dr. Cheyne has thoroughly explained the mechanism, by which such effects as these are producedⁱ. However, as all great medicines are to be looked upon as edge-tools, so this, as much as any, requires caution: and indeed more than is commonly observed by those, who are most bold in the use of it.

For it cannot be denied, that the excessive gravity alone of this mineral, however serviceable in other respects, may, if it happens to lie in any quantity in the interstices of the nervous filaments, induce symptoms of dangerous consequence, as spasms, contractions, palsies, &c. which we find they commonly suffer,

^g De Morb. Gallic. cap. lxxvi.
Gall. pag. 599.

^h De Morb. Gall. inter Autores de Morb.
ⁱ New theory of continual fevers.

who have either been for a long time employed in rubbing quicksilver upon looking-glasses, or in any work by which they are obliged to draw in mercurial fumes with their breath, or who have been too much daubed with mercurial ointments; as shall be observed anon.

Neither is this all. Experience has convinced us, that repeated doses of crude mercury have in some cases, even a considerable time after they have been taken, exerted their force, and thrown the body into unexpected disorders.

I remember two accidents of this kind (and one of them proved fatal,) in which when small quantities had been given for many days together, a violent salivation ensued, more than two months after the use of it had been left off.

And not long since, I saw a young lady, who having swallowed about six drachms every morning, three successive days, was salivated three weeks. The flux then ceased, but returned after six months, and held a month; and once more came on, in the same manner, two months after. The breath was each time strongly affected, as is usual in mercurial spittings. So surprisingly active is this mineral, even simple and unpounded.

We may learn from hence, that it will be always right, in dealing with this slippery remedy, to take care that it has a free passage through the body; which must be done either by purging, or by combining it with substances, which will carry it off either by perspiration or urine: for what is called alcalifying it, does not deserve the name of a preparation.

Now as to sublimate, most certain it is, that the saline particles impart to the Mercury this noxious quality; or, to speak more properly, that the salt receives from the mercurial corpuscles such an increase of its gravity and momentum, as renders its cutting corrosion more effectual and penetrating: for the manner, after which this matter is done, is probably this.

The compounding parts of the Mercury, though so minutely divided by the action of the fire, as to rise in the form of a fume, yet are still solid and ponderous bodies : and by reason of their extreme parvity, being perhaps simple and elementary corpuscles, they will easily be lodged in the pores and interstices of the saline crystals ; which being composed of the atoms of salt, variously by sublimation combined and united, are a kind of cutting lamellæ or blades ; the force of which could never have been very penetrating, upon the account of their lightness and easy dissolution, if the Mercury, without blunting their edge, or breaking their figure, did not lend them an additional weight, and thus at the same time strengthen their action, and prevent their quick solution by the juices of the stomach : which cannot now disjoin their compounding parts, because the vacuities, into which they should, in order to do this, insinuate themselves, are already possessed, and taken up by the mercurial globules.

In short, these crystals, which are to be considered as so many sharp knives or daggers, wounding and stabbing the tender coats of the stomach, and abradging their natural mucus, will irritate the nervous liquor : upon which convulsions and vomitings, with excessive pains, must follow. And the blood-vessels being at the same time pricked, all the adjacent parts will be inflamed, the blood will stagnate : then come on ulcers, which, though singly small, yet being many in number, do all together make up large gangrenes.

This being the nature of sublimed Mercury, it may not be amiss to inquire, how it comes to pass, that this same compound resublimed with live Mercury in the proportion of four parts to three, (for the sublimate will not take up an equal quantity) especially if the work be repeated three or four times, loses its corrosiveness to that degree as to become not only a safe, but, in many cases, a noble medicine. For I do not see, that any of
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the chemical writers have hit upon the true solution of this phenomenon.

Here then it is to be considered, that the action of the saline crystals depending upon their solidity and largeness, these must necessarily, by every subsequent sublimation, be broken into smaller and smaller parts. The mercurial globules, (for the reasons given by the author of the forementioned Theory of Fevers) arising more quickly and easily than the salts, quit the interstices in which they were lodged, and the crystalline blades are divided every time more and more by the force of the fire: whereupon a new combination of parts succeeds. And although there be a greater proportion of the mineral to the salts than before, which makes dulcified Mercury specifically heavier than the corrosive; (for this contains two parts of salt, and one of Mercury; whereas the dulcified, well prepared, has equal parts) yet the broken pieces of the crystals uniting into little masses of differing figures from their former make, those cutting points are now so much smaller, that they cannot make wounds deep enough to be equally mischievous and deadly; and therefore do only vellicate and twitch the sensible membranes of the stomach to that degree, as excites them to an excretion of their contents and glandular juices, upward or downward, according as the force of irritation is greater or less.

Thus a violent Poison is mitigated into a vomit or purge: nay, it may easily happen, (especially in robust constitutions, and if the bowels be at the same time by any means defended against the stimulating power of the medicine) that this twitching may be so slight, as to be almost insensible, and hardly troublesome. And then the mercurial globules, being freed indeed from most of the saline parts in their passage through the primæ viæ, but still having a mixture of some few of them, are quickly conveyed into the blood: where, by their motion and weight, they must necessarily dissolve the preternatural cohesions of all the liquors, particularly of those, which circulate in the smallest canals, and
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are most viscid and tenacious, making them more fluxii and thin, or of more easy secretion. Whereupon all the glands of the body are, as it were, set to work, and scoured of their contents : but the salival ones especially, being many in number, very large and wide, and the juice they separate of a tough and ropy substance, so that a considerable quantity of it is accumulated, before it is forced out at the orifices of the ducts ; these effects will be most remarkable in them, and a salivation or spitting must continue so long, till the active mineral particles are, through these and the other passages, discharged out of the body.

As the difference between Mercury corrosive and dulcified lies in a greater and lesser degree of operation and force, so this same consideration distinguishes the several preparations of this mineral from each other ; which though very many, yet do all vary their effects in the body, only according as the mercurial globules are differently combined with salts, and the points of these more or less broken by the action of the fire, in the burning of spirits upon them, and such like managements : and therefore however dignified with the great names of Arcana, Panacea, Prince's Powders, &c. they do not afford us any thing singular and extraordinary, beyond what we may with equal advantage promise ourselves from some or other of the most common and usual processes.

We may also fairly conclude from this reasoning, that the safest way of raising a salivation is by internal medicines ; since whatever mischiefs can be apprehended from these, may in a greater degree follow from the external use of Mercury : not only because, as we have already hinted, the mineral globules, being intimately combined with salts in the several preparations given inwardly, will, by the irritation of these, be easily and fully thrown out at the organs of secretions, till the blood is quite discharged of its load ; whereas in all the daubings with mercurial ointments, we can never be certain, that none of the heavy particles are left lodged in the interstices of the fibres, or

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cells of the bones ; but also, in as much as by computing the portion of Mercury in all the doses necessary to promote a spitting, and the weight of the same mineral usually applied when this is done by unction, it will appear that the quantity in the latter case vastly exceeds that in the former, and consequently that the inconveniences to be feared will be in the same proportion.

Therefore this external management of quick-silver is chiefly to be recommended, where the constitution is not broken, or ulcers and tumours require a particular cure, by liniments, &c. and a more thorough cleansing of the body. And even in such cases, it will certainly be best to annoint daily with small quantities, and not to raise a high spitting ; but promote the other secretions, particularly sweating and urine, by plentiful drinking of thin liquors ; and also, if there be occasion, by laxative medicines : for it is well known, that cures are often wrought by these means, although the mouth has never been ulcerated by the Mercury. At least this method will be a remedy for a time, and enable the patient to recover strength ; so that he may afterward, if it be necessary, undergo a more severe treatment.

It may be observed, that as the earliest use of Mercury was in unguents and emplasters, so most of the prejudices and outcries against it are owing to effects produced this way. For the first attempts of the cure of venereal maladies by this remedy were learned from the Arabians *, who, having recommended mercurial ointments in the lepra or scabies, gave a handle to the Italian physicians to try their efficacy, in removing the foulness of the skin from a new and terrible contagion : neither were they sparing of their liniments, which they continued to rub in for twelve, fifteen, nay sometimes for above thirty days toge-

* Vid. Joan. Baptist. Montan. tract. De morb. Gallic. inter autor, De morb. Gall. p. 482. & Fallop. De morb. Gall. cap. lxxvi.

ther¹. So that it is no wonder, if they often met with very untoward symptoms from so severe a treatment; and if (as some of them^m affirm) they now and then found Mercury in the rotten bones of their patients, who had, it may be, suffered too much both from their disease and their physician.

There are many histories of this kind; neither are instances wanting in living persons of Mercury running out of the body, from a tumour, either suppurated, or opened by a caustic: nay there is a case upon record, in which, upon opening a vein, some drachms of it flowed out with the bloodⁿ.

To this examination of the properties and effects of Mercury, I shall add an inquiry into the nature of another mineral Poison, not very unlike it, either in its make or action: this is Arsenic.

There is some confusion in the accounts, which authors give of this mineral. This arises from their not distinguishing the Arsenic of the ancients from what is now so called. I shall therefore exactly describe both the one and the other, not only from the latest writers of natural history, (for what Agricola, Matthiolus, Schroder, and even Wepfer, the best authors extant when this book was first published, have delivered to us on this subject, is all wrong) but more particularly from some experiments communicated to me by the learned Dr. Hampe, a most excellent chemist, physician to her royal highness the princess of Wales.

The Arsenic of the Greeks, Ἀρσενικόν or Ἀρρῆνικόν, was what the Latins named Auripigmentum, we Orpiment.

¹ Nicol. Massa De morb. Gall. tract. iv. cap. 2.

^m Argentum vivum accepi ex osse cujusdam corrupto, quem perunctum ob empiricis plus decies ferebant, non semel emanavisse. Anton. Gall. in lib. De ligno sancto non permiscendo.

Non semel in sepulchris argentum vivum in mortuorum capitibus reperi. Anton. Musa Brasavolus in tract. De morb. Gall.

ⁿ Vid. Ephemerid. Germanic. Dec. 3. ann. 5. Observ. 172.

This is found in Greece and Hungary, in particular mines and veins, and is never mixt with any other mineral. It is of a foliaceous or laminated texture, and contains a great deal of sulphur : as appears by its inflammability, and by its giving, when mixt with mercury sublimite, a true cinnabar. By simple fusion it runs into a mass of a cinnabarine colour, called sandaracha. Though it yields a regulus, in every respect like to the regulus of true Arsenic, yet it does not act as a strong Poison. Hoffman^o gave a good quantity of it to a dog, without any harm. The reason of this is, because its metallic particles are combined with sulphur, and not with salt, at least in any considerable degree.

Such a composition makes this substance more useful in painting than in physic ; and, together with its colour, has induced those chemists, who have fancied that metals may be transmuted, to take it for the subject matter of their great work : for so they call the making of gold. They have very fondly grounded their hopes upon some odd ænigmatical verses in the Sibylline Oracles^p. But though some learned men have attempted to explain this riddle, as descriptive of the Greek name Ἀρσενικόν ; yet none have so far succeeded, as fully to reconcile the numbers therein expressed at length, with those contained in the letters, of which that word consists^q. However, be that as it will, true it is, that this great expectation from this mineral is as old at least as the time of Caligula, that is, of a more ancient date considerably, than the far greatest part of these supposititious and ill-contrived compositions, which bear the sacred name of oracles : for that

^o Observ. Physico-chym. lib. iii. Obs. 1.

^p Ἐννέα γράμματα ἔχω, τετρασύλλαβός εἰμι, νόμι με.

Αἱ τρεῖς αἱ πρῶται δύο γράμματα ἔχουσιν ἑκάστη,

Ἡ λοιπή δὲ τὰ λοιπὰ, καὶ εἰσὶν ἄφωνα τὰ πέντε.

Τὸ παντὸς δ' ἀριθμὸς ἑκατοντάδες εἰσὶ δις ἑκτῶ,

Καὶ τρεῖς τρεῖς δεκάδες, καὶ δις τετρα.

Lib. i.

^q Vid. Fabric. Bibl. Græc. V. xii. pag. 696.

covetous emperor, as Pliny relates ^r, ordered a great quantity of orpiment to be melted and managed, that he might extract gold out of it; and made some, but (as it usually happens in such experiments) the profit did not answer the expence.

What we now call Arsenic is of three sorts, white, yellow, and red. All these are factitious, and very probably not known to the ancients. They are made in this manner.

At Schneebergh in Misnia there is found, in great quantities, a particular kind of mineral called cobalt, of a greyish colour, and ponderous. This roasted and calcined, in a furnace made for that purpose, yields a white smok, which gathers, at the end of a very long funnel, into an ash-coloured powder, as fine as flour. This, with the addition of a true proportion of pot-ash, is sublimed, and gives the white crystalline Arsenic ^s.

The metallic earth, of a vitreous nature, which remains after this operation, melted with a due proportion of calcined flints and pot-ash, makes what is called smalt. The cobalt contains about three parts of Arsenic, and one of this earth.

When newly sublimed and perfectly pure, it is a shining white transparent body, not unlike to a metallic glass: in the air it changes its bright whiteness to a milky colour, and becomes entirely opaque. It is not inflammable; but evaporates in the fire, without leaving any earth behind, in a white smok, smelling like garlick. It affords a semimetallic regulus, both by sublimation and precipitation. The first is foliaceous, light and spongy; the other ponderous, though also of a foliaceous texture, and resembles bismuth. This last regulus may be made without iron, with the black flux only; or with nitre and tartar, in the same manner as is the regulus of antimony; but it requires a nice operator.

White Arsenic is entirely soluble in water. If one part of it be sufficiently boiled in fifteen parts of distilled or rain-water,

^r Nat. Hist. lib. xxxiii. c. 4.

^s See Kunckel's Annotations upon Neri's Art of Glass, in German; and Philosophical Transact, N^o 293.

it gives by evaporation salts of triangular planes, which unite into octædral crystals: and in these, either beat to powder, or dissolved by boiling, metallic globules, resembling those of quicksilver, are plainly discovered by the microscope. Which confirms what Kunckel says, that a great part of Arsenic is mercury¹: so that Arsenic may be defined to be a volatile metallic salt.

Yellow Arsenic is prepared by subliming white Arsenic with the addition of a tenth part of sulphur. This is not so transparent as the white, but splendid, and very like to a metallic yellow glass.

The red differs from the yellow only in this, that a greater quantity of sulphur is added, together with a particular kind of a red cobalt called kupfer nickel.

This being the composition of this mineral, we may readily understand the manner of its deadly operation. The case is plainly the same with that of sublimate corrosive: and as there the salts combined with the mercurial globules form cutting crystals; so here the metallic particles, which make the regulus, give a force and solidity to the saline bodies, which wound the stomach and guts, as the others do, even to such a degree as to cause mortifications.

The several histories related by Wepfer² put this out of question: it is sufficient to our purpose to mention one.

A dog having eat some fat mixed with white Arsenic, died the next day. The upper part of the stomach, when opened, was red and inflamed; the coats thinner than ordinary; the bottom of it was covered with a fetid slime, and some pieces of fat: the thin guts were so corroded, as to be pervious in three places, two of the ulcers so large that they would easily admit a bean: the cavity of the abdomen contained a yellowish ichor tinged with blood.

¹ Chemical philosophy confirmed by experiments, chap. xi. in Pyrotechnical Discourses. Lond. 1705. 8vo.

² Cicut. aquat. hist. p. 274, & seq.

The case being thus, one would wonder, what should induce authors to prescribe so corrosive a mineral to be worn upon the pit of the stomach, as an amulet against the plague. This trick we may well believe to be dangerous, when Lionardo di Capoa * tells us of a child killed by the violent vomiting and purging, occasioned from a slight wound made in the head by a comb wet with oil, in which Arsenic had been infused: for the pores of the body being opened by heat and exercise, some of the noxious effluvia might easily insinuate themselves into the part. Accordingly Crato ′ observed an ulcer of the breast caused by this application; Verzascha ″ violent pains, and fainting fits; Diemberbroeck ‹, and Dr. Hodges ‰, death itself.

The truth of the matter is, this practice seems to owe its origin to a mistake. Perhaps some of the Arabian physicians had commended *darfini* worn in a bag for a preservative in plague time. This in their language signifies cinnamon: but the Latin interpreters retaining the same word in their translations, (as was frequently done) one or other afterward not understanding its meaning, and deceived by the likeness of the sound, substituted in its place *de arsenico*, as if *darfini* were all one with *zarnich*. The authority of the first author served to propagate the error: nor were those wanting, who reasoned upon the matter, and found it agreeable to their philosophy, that this mineral should draw to itself and concenter the arsenical effluvia out of the air, and thus secure the body from their infection; these being, as they imagined, the common cause of pestilential diseases.

Having thus particularly discoursed of the nature of these two Poisons, I shall not need to insist upon any more out of the mineral kingdom.

* Incertezza de' medicamenti, pag. 82. ′ Epistol. 168. ″ Observ. 66.
 ‹ De peste, Histor. 99. Annotat. ‰ De peste Lond. pag. 239.

All of them bear some analogy to the former, and are more or less dangerous, according as their salts receive a differing force from the metallic particles. For this reason, as we have observed, that the most virulent may be mitigated by breaking the points of the saline crystals; so on the other hand, the most innocent minerals may become corrosive, by combining them with salts: as we see in the several preparations of silver, antimony, iron, &c.

This put me in mind of making a remark, which I think both curious and useful. It is observed, that the fumes of lead are very noxious to those, who are constantly employed in melting it, as plumbers, casters of shot, &c. A learned physician, of my acquaintance, lately told me, that a great artist in this way had assured him, he had found by experience, that this inconvenience did not attend the melting new lead, in any degree so much as it did the melting it when it was old: that he had workmen, who had for many years laboured under him, in casting new metal, and had never suffered in their health by it. This difference he rightly ascribed to the corrosive quality, which lead acquires from the salts in the air, by lying long exposed to it.

For the fumes of minerals are only parts of the respective substances minutely divided; and therefore will not only produce suitable effects, but also in a more dangerous way; being not so much guarded against, and yet admitted farther into the body, that is, into the lungs, in respiration, as well as into the stomach, by means of the saliva: not to mention the impression upon the spirits in the nostrils, which must certainly be very considerable.

I had once in my possession, given me by an ingenious chemist, a clear liquor, which though ponderous, was so volatile, that it would all fly away in the open air, without being heated; and so corrosive, that a glass stopple of the bottle, which contained

tained it, was in a short time so eroded, that it could never be taken out. The fume from it was so thin, that if a candle was set at some distance from the bottle, upon a table, the heat would direct its course that way; so that it might be poisonous to any one that sat near to the light, and to no body besides. I know the composition of this stygian spirit; but it is better, that the world should not be instructed in such arts of death. It is sufficient to our purpose to observe, that it was salts combined with metallic bodies.

OF POISONOUS PLANTS.

FROM Minerals we come to poisonous Plants. The most noted of these are the *Cicuta* and *Aconitum*. The former is of two sorts, our common Hemlock; and the *Aquatica*, which Mr. Ray calls *Cicutaria palustris tenuifolia*.

What the *Cicuta*, so much in use of old for killing, especially at Athens, was, we don't know: it is most probable, that it was not a simple but compounded thing. The history of the noble death of Socrates, related by his disciple Plato^a, (if this is not wrought up with more of ornament than truth) seems to evince it to have been a mixture of some anodyne juices with others of a corrosive nature. Theophrastus^b says, that Thrasyas, a great physician, had invented a composition, which would cause death without any pain; and that this was prepared with the juice of hemlock and poppy together, and did the business in a small dose.

An extract of this kind might perhaps take away life with such symptoms, as this great philosopher went off with, viz. eyes fixt, heaviness and insensibility in the legs, then great coldness in them, which by degrees seized the vital parts.

I am the more inclined to believe this, from what is recorded anciently of the people of Marseilles, that they had a poison kept by the public, in which *Cicuta* was only an ingredient; a dose of which was allowed by the magistrates to any one, who could shew a reason why he should desire death. For, this cus-

tom,

^a Phædon, sub finem.

^b Hist. Plant. lib. ix. c. 17.

tom, as Valerius Maximus observes^c, came from Greece, particularly from the island Ceos, where he saw an example of it in a woman of great quality, who, having lived very happy ninety years, obtained leave to die this way, lest by living longer she should happen to see a change of her good fortune.

But the *Cicuta Aquatica*, at least in our colder countries, is much more violent than the other. Wepfer has, in a very learned treatise, described its deadly effects in some children, who by mistake had eat of the roots of it. These were excessive pain and heat in the stomach; terrible convulsions, with the loss of the senses; distortion of the eyes; flowing of blood out at the ears; the jaws so hard shut that no force could open them; efforts to vomit, but nothing thrown up; frequent hickups; with a great distension and swelling, especially at the pit of the stomach; and when death had concluded the tragedy, a continued running of green froth at the mouth.

Stalpart vander Wiel gives the like account of two persons killed at the Hague by the same roots^d.

In a dog, that, for experiment's sake, died by this poison, the stomach when opened was found quite constringed, and shut up at both orifices; its inward surface red, with livid spots here and there.

Thus it appears, that this plant consists of hot, acrid and corrosive parts; which by rarefying the natural juices of the stomach, and hurting its nerves, are the cause of those terrible disorders, which have been described.

For, upon the sense of a violent irritation and pain, the nervous fluid is by the mind, in a kind of surprise and hurry, determined in great quantities to the affected part; in order to throw off the cause of the disagreeable sensation: which, if the stimulus be not over great, is done by the contraction of the fibres of the stomach, and muscles of the abdomen, causing vomiting.

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^c Lib. ii. c. 6. §. 8. Vid. Ælian. Var. Hist. lib. iii. c. 37.
Cent. i. Obs. 43.

^d Observat.

miting. But when the painful twitching is quite intolerable, the business is over-done; and the fibres are drawn into spasms, which contract the mouth of the stomach, so that the noxious matter cannot be discharged, but is kept there in continued force and action. And by the communication of the infection through the nervous system, the whole body quickly suffers; the blood-vessels are torn and broken by the violence of the convulsions, and blood gushes out from the ears, nostrils, &c.

This universal muscular contraction was the reason, that one of the children, attended by Wepfer, made urine in the midst of the agony, to the height of five or six feet, with a strength and violence surprising to the spectators.

The case of the *Aconitum* is much the same. This is our napellus or monks-hood; and its effects do so nearly agree with those now related of the *Cicuta*, that I shall not need to recite them: the experiments of Wepfer^e are full and convincing. And indeed, as all the histories, which this same author has so carefully given us, of trials made with several vegetable poisons, as the *Solanum*, *Nux Vomica*, *Cocculus Indicus*, &c. on different creatures, put it out of all doubt, that the common mischief of these is a twitching and slight inflammation of the stomach, with an affection of the nervous fluid; so it appears from hence, that virulent plants, although they may be distinguished even from one another by particular virtues, do however kill by a like operation and force, which differs chiefly in degree from that of noxious minerals.

Nor is it at all strange, that the symptoms from a vegetable, and from a mineral virulency, should be so different, although of the same kind, and only of unequal force: for the more solid parts of minerals, eroding the coats of the stomach, induce a perfect mortification and gangrene, and thus do their work at once; whereas the weaker salts of plants can make only pungent irritations, upon the painful sense of which the animal is

thrown

thrown into convulsions, and dies by these prevailing in all parts of the body.

Upon this score, though mineral poisons do not commonly pass the *primæ viæ*, vegetable ones in some cases may: just as we find that those medicines, which have a great degree of irritation, presently induce a vomiting; whereas the same twitching a little weakened suffers them to pass into the intestines, and work downward by stools.

By this we may perhaps give some guess at the nature of those poisons, with which they tell us the natives in some parts of Africa and India are so expert at killing, that they can do it in a longer or shorter time. These are most probably either the fruits, or the inspissated juices of corrosive plants, which inflaming the bowels, may cause little ulcers there, whose fatal consequences, we know, may very well be slow and lingering.

This I am the rather induced to believe, because an ingenious surgeon, who lived in Guinea, told me, that the antidote, by which the negroes would sometimes cure those who were poisoned, was the leaf of an herb, which purged both upward and downward. For by this means the stomach might be cleared from the adhering corrosive parts of the venom. Yet I can hardly think it possible at the same time, that they should be able, by varying the composition or quantity of the dose, to ascertain the time in which it shall kill, to a week, month, &c. nor have I ever met with any person, who could attest this to be matter of fact: though repeated trials and observations may help one well practised in such tricks to give notable conjectures in this point.

The ancients indeed pretended much the same thing with their *Aconitum*, of which they seem to have made a kind of secret and mystery: as we learn from Theophrastus^f, who says, “the ordering of this poison was different, according as it was “designed to kill in two, three months, or a year.” But this he relates only as a common tale or opinion, and not as a story, to which himself gave any manner of credit.

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^f Hist. Plant. lib. ix. c. 16.

It is very plain, that the common cure of all poisons, taken into the stomach, must be by throwing them up again by vomiting as soon as possible, and defending the membranes from their pungent acrimony. Drinking very large quantities of warm milk, with oil of sweet almonds, till the vomiting ceases, will answer the first intention: the other, in mineral poisons, (for the effects of the vegetable, after they have been vomited up, generally go off, by diluting plentifully with soft and fat liquids) requires particular care, which, I think, may be in this way. We have found the force of these to depend upon a combination of metallic particles with saline crystals: therefore the disuniting of these must destroy their power. This (as Kunkel² has hinted) may be done, by drinking a quantity of a lixivium, made by a solution of salt of tartar in water: for this salt, uniting with the corrosive crystalline salt, will, (after some degree of effervescence) kill it, as the chemists speak; by which means, being disengaged from the mineral globules, it will be rendered of no effect.

This practice is founded upon a remarkable experiment, related by the same author, which is this. A child's head, for the cure of scabs, was daubed over with an ointment made of ung. pomat. and sublimate corrosive: this immediately caused such a swelling, with intense pain and inflammation, that the eyes and nose could not be seen. In this extremity, when the patient was thought to be dying, a learned chemist, happily coming to the house, advised to foment the head all over with a strong lixivium: this, in a few hours, quite removed the terrible symptoms.

What such an application could do outwardly, it may, upon the same rational grounds, be presumed it will perform likewise in the stomach, at least in some degree; and thus become an antidote against the most violent of all known poisons.

ESSAY

² Chemical philosophy confirmed by experiments.

ESSAY V.

OF OPIUM.

THE ancients having experienced, that Opium would oftentimes kill, though taken in no large quantity, ranked it with poisons, and gave it the first place among those, which from their stupefying quality they called narcotic.

True indeed it is, that we do every day find this to be, in a small dose, one of the most noble remedies in the world. But it is not worth the while to engage in the controversy, how far poisons are medicinal : since it is notorious enough, that medicines sometimes prove poisonous. And take the matter as we please, it may serve to very good purposes to understand the manner of operation of so celebrated a drug, and help us in a great measure to ascertain its use in different cases, if we are beforehand rightly apprized of its nature and way of acting.

In order hereunto, it is necessary, besides some other præcognita, since one of the chief virtues of this medicine is hypnotic, to define distinctly what sleep is, or rather, (to avoid confusion and disputes about words) what difference there is between an animal body, when asleep and when awake : for I suppose the history, manner of preparing, &c. of Opium, to be already known.

First then, there is no one but knows, that in sleep there is a cessation from action. When waking, we walk, discourse, move this or that limb, &c. but in natural and undisturbed rest
there

there is nothing of all these : that is, whereas, being awake, we perform several motions by the voluntary contraction of our muscles ; when asleep, those muscles only are contracted, whose action is in a manner involuntarily, or to which the mind has always so constantly determined the spirits, that it does it by a habit, without the intervention of the reasoning faculty : such are those of the heart and breast.

So that there is at this time a kind of relaxation or looseness of the moving fibres of the several members ; or at least such a quiet position and state of them, by which all the antagonist muscles are in an æquilibrium and equality of action, not overpowering one another. For this indeed seems to be one great design of sleep, to recover to the parts over-stretched by labour their former tone and force : and therefore we naturally, when composing ourselves to rest, put our body into that posture, which does most favour the particularly wearied limbs, and conduce to this end.

In the next place it is very plain, that there is in sleep not only a rest, and suspension from acting, of most of our bodily organs, but even of our thinking faculty too ; that is, (for I would prevent cavils) a ceasing from such thoughts, as when waking we are exercised about, which we reflect upon, and will to employ our mind with. For though dreams are thoughts, yet they are but imperfect and incoherent ones, and are indeed either so faint and languid representations, as to be consistent with our sleep, as some may be : or else if they be strong and lively, they are, as every one knows, the interruption and disturbance of it.

From hence it will follow, that the motion of the arterial fluid must be, *cæteris paribus*, more sedate, even and regular, in the time of sleeping than waking. For, besides the various alterations, which in the latter state this receives from the several passions of the mind, the very contractions of the muscles themselves in exercises of the body differently forward its course : whereas in sleep the force of the heart and pectoral muscles

being more constant and uniform, gives it a more calm and equally continued impulse.

Hence also it will come to pass, that the influx of the liquor of the nerves into the organs of the body, as also its reflux towards the brain, is in sleep either none, or very inconsiderable : that is, that this fluid has at this time but little or no motion. For it is muscular action and sensation that require it to be thus determined this way or that, which are now hardly any. And yet by the arrival of blood at the brain, this juice will still be separated there, fit to be derived into its canals or tubes : so that by this means there will be a kind of accumulation, or laying up in store, of spirits for the offices and requirements of waking.

Thus we may in short look upon the time of watching, as the time of wearing out, or the destruction of the animal fabric ; and the time of sleep, as that in which it is repaired and recruited : not only upon the account of what we have just mentioned concerning the nervous liquor, but also with respect to all the other parts, as well fluid as solid. For action does necessarily by degrees impair the springs and organs ; and in motion something is continually abraded and struck off from the distractile fibres, which cannot otherwise be restored than by their being at rest from tension. Besides that, such a regular and steady course of the blood, as we have observed to be in sleep, is by far more fit and proper for nutrition, or an apposition of parts to the vessels, which an uneven hurry of it is more apt to tear off and wash away.

The case being thus, it is very plain, that whatsoever can induce such a disposition of the fluids and muscular parts of the body, as this we have described, will so far cause sleepiness. And in like manner, when any thing interposes and hinders this composedness and tranquillity, the removing of the impediment will be the causing of sleep : inasmuch as this is only reducing the animal œconomy to its right state, in which by natural order there must be a succession of sleeping and waking.

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Thus it appears how necessarily continued exercises make us sleepy, since these exhaust the juice of the nerves ; that is, both lessen its influx into the organs of motion, and incline the mind not to determine it any longer that way, upon the account of the pain and uneasiness, with which too violent a tension of the parts is always attended : which therefore we must needs desire to relax, or lay to rest.

That sleepiness, which follows upon a fulness of the stomach after eating or drinking, is owing to a different cause ; and does indeed so nearly fall in with the effects of opiate medicines, that it requires a particular consideration.

As hunger, or the emptiness of the stomach, is a painful sensation ; so the satisfying, or removing of this, is a pleasing or agreeable one. Now all pain is a stimulus upon the part affected ; and this, we all know, being attended with contractions of the pained membranes, causes a greater afflux than ordinary of the nervous juice that way. On the other hand, pleasure, or a delightful sensation in any part, is accompanied with a smooth undulation, and easy reflux of the liquor of the nerves towards the brain. This is, as it were, the entertainment of the mind, with which being taken up, it does not determine the spirits to the organs of motion : that is, there is such a relaxation of the muscular fibres, and such a disposition of the nervous fluid, as we have observed to be necessary to sleep.

This is the reason of that chilliness in the limbs, which we commonly complain of after a good feast.

If it seem strange, that a pleasure in the stomach should so powerfully influence the mind ; let it be considered, on the other hand, how violent effects an uneasy and disagreeable sense in the same part does produce ; what a terrible agony two or three grains of crocus metallorum throws the whole fabric into ; how readily the fluid of the nerves is with a more than ordinary impetus determined and commanded into the muscles of the stomach.

stomach and abdomen, in order to throw off the enemy, and remove the ungrateful sensation.

Now the consequences, which we have ascribed to a pleasing sense in this part, are only just the contrary of these, we find the opposite affection of pain induces. And indeed pleasure and pain are two great springs of action in the animal œconomy; the changes they make in the fabric are the causes of many effects which seem surprising, because we do not regard the mechanism, by which they are produced: but these must be more considerable in the stomach than any where else; this part being, for very wise purposes, of so acute a feeling, that some philosophers have for this reason thought it to be the seat of the soul.

Besides this consideration, we must take notice, that the stomach, being distended with food, presses upon the descending trunk of the aorta, and thus causes a greater fulness of the vessels in the upper parts: whereupon the brain is loaded, or the derivation of spirits into the nerves diminished, and inactivity or drowsiness ensues. From hence proceed those flushings in the face, redness, &c. after plentiful eating or drinking, most visible in those, whose vessels are lax and weak: as in exhausted and hectic persons they more especially are.

Thus we may, without the assistance of the new chyle entering into the vessels, account for that inclination to sleep, which follows upon a full stomach; though we must also allow the distension from this to be a considerable cause of the same effect. But this does not happen immediately, nay, sometimes perhaps not within two or three hours after eating: and therefore the sudden drowsiness must (as well as the present refreshment and reviving, which meat gives) be chiefly owing to some more speedy alteration.

We come then in the next place to Opium itself; the chemical analysis of which, out of six ounces, afforded, of a volatile alkaline spirit, not very unlike to that drawn from harts-horn, two ounces; of fetid oil, five drachms, one scruple, sixteen grains;

grains ; of coal, void of salt, two ounces, two drachms, one scruple, four grains.

The virtues therefore of Opium are owing to a volatile alkaline salt, intimately mixt and combined with an oily, sulphureous substance : the effects of which we must consider, first of all upon the stomach, and afterwards, when they have passed the *primæ viæ*, upon the arterial fluid itself.

An agreeable sensation produced in the stomach, together with a distension of its membranes, we observed before to be the cause of that sleepiness, to which we are so prone after eating. The one of these engages the mind, the other acts upon the body. For pleasure amuses the soul, as it were, so that it does not think, or exercise itself about any outward objects : that is, is inclined to rest. And the fulness of the vessels in the brain checks and hinders, in some measure, the derivation of the nervous juice into the organs, &c.

Now they, who take a moderate dose of Opium, especially if not long accustomed to it, are commonly so transported with the pleasing sense it induces, that they are, as they oftentimes express themselves, in heaven : and though they do not always sleep, (which proceeds from the presentation of pleasing images to the mind being so strong, that like dreams they over-engage the fancy, and so interrupt the state of rest) yet they however enjoy so perfect an indolence and quiet, that no happiness in the world can surpass the charms of this agreeable extasy.

Thus we have from this medicine, but in a far more eminent degree, all those effects, which we observed to follow upon that grateful sense in the stomach, which a moderate fulness produces. For no bodies are so fit and able pleasingly to affect our sensible membranes, as those which consist of volatile parts, whose activity is tempered and allayed by the smoothness of some lubricating and oily ones : which, by lightly rarefying the juices of the stomach, and causing a pleasant titillation of its nervous coat, will

will induce an agreeable plenitude, and entertain the mind with ideas of satisfaction and delight.

The case being thus, we easily see upon what mechanism the other virtues of Opium depend, its easing pains, checking immoderate evacuations, &c. not only in that the mind being taken up with a pleasing sense, is diverted from a disagreeable one; but all pain being attended with a contraction of the part, that relaxation of the fibres, which it now causes, eludes and destroys the force of the stimulus.

In like manner, in immoderate secretions there is most commonly an irritation of the organs, the removal of which will abate the discharge. And herein lies the incrassating quality of this medicine, in that the twitching sense upon the membranes of the lungs, bowels, &c. being now lessened, the sharp humour is suffered to lodge there in a greater quantity, before it is so troublesome as to be thrown off and expelled: it being all one as if there were no irritation of the part, if the uneasy sense thereof be not regarded by the mind.

These effects will all be heightened by the mixture of the opiate particles with the blood; which is hereupon rarefied, and distends its vessels, especially those of the brain: and this does still to a greater degree lessen the influx of the nervous fluid to the parts, by pressing upon the little tubuli, or canals, through which it is derived.

This is the reason of that difficulty of breathing, which they for a time experience, who take this kind of medicine: this symptom being inseparable from the rarefaction of the blood in the lungs.

From hence it appears, that the action of Opium is very analogous to that of other volatile spirits, only that a small portion of it has a force equal to that of a greater quantity of most of them.

This is very evident in those, who accustom themselves to take large doses of it; as the Turks and Persians do to that degree, that

that it is no uncommon thing there to eat a drachm or two at a time: for the effects of it in them are no other than downright drunkenness; upon which account "it is as common a saying with them, and on the same occasion, "he has eat Opium;" as with us, "he has drank too much wine."

Neither indeed do they otherwise bear such large quantities of it, than our tiplers will a great deal of brandy: that is, by habituating themselves to it by degrees, beginning with small doses, and requiring still more and more to raise themselves to the same pitch. Just as Galen^b tells us of a woman at Athens, who by a gradual use had brought herself to take, without any hurt, a considerable quantity of Cicuta, or hemlock. Which instance is the more to our purpose, because Nic. Fontanus^c knew one, who being recovered of the plague, and wanting sleep, did, with very good effect, eat hemlock for some time; till falling ill again of a fever, and having left off the use of this remedy, he endeavoured to procure rest by repeated doses of Opium, which (nature having been accustomed to a stronger alterative) had no operation, till the help of Cicuta was again called in with desired success.

It is a sufficient confirmation of all this reasoning, that Prosper Alpinus^d observed among the Egyptians, those who had been accustomed to Opium, and were faint and languid through want of it, (as drinkers are if they have not their liquor) to be recovered, and put into the same state of indolence and pleasure, by large doses of Cretic wine made hotter by the infusion of pepper, and the like strong aromatics.

Nor is it perhaps amiss to remark, than in maniacal people, as is frequently observed, a quadruple dose of Opium will scarce produce any considerable effect. Now in persons so affected, the mind is deeply engaged, and taken up with some images, or
other,

^a Vid. Belon. Voyag. lib. iii. c. 15.
c. 18. ^c Respons. & Curat. Medic. p. 162.
lib. iv. c. 1.

^b Simpl. Medicam. Facult. lib. iii.
^d Medicin. Ægypt.

other, as love, anger, &c. so that it is not to be so easily moved or diverted by those pleasing representations, which it would attend to at another time, and upon which the virtues of this medicine in a great measure depend. Besides this, those who are maniacal do to a wonder bear the injuries of cold, hunger, &c. and have a prodigious degree of muscular force; which argues the texture of their blood to be very strong, and the cohesion of its globules great: so that the spirituous parts of the opiate cannot make that disjunction and rarefaction of this fluid in them, which it does in ordinary bodies and constitutions.

Many are the improvements, which might be made of this theory, with relation to the practice of physic: but these will be obvious enough to one instructed in the animal œconomy.

I cannot, however, omit two useful remarks from it. The first is, that by not understanding the manner, in which this noble medicine acts, when it checks immoderate secretions, physicians are often led into wrong methods, and give it to stop those evacuations, in which there are no spasms or painful irritations; as particularly, in colliquative diarrhœa's attending hectic fevers: whereas, it is manifest, it must in such cases (without the desired effect) do real mischief, by relaxing the fibres, and heating and rarefying the fluids, already too thin and broken in their texture.

And, on the other hand, it is easily seen, that this same property, by which it takes off cramps in the nerves, and thus cures excretions depending upon them, will very often happily promote those discharges which are natural, when they are unseasonably interrupted by violent contractions. Thus opiates, in nephritic pains, move the urine stopped by gravel and stones; and, in uterine cases, assist nature in propelling the menses, the fœtus and the lochia.

To conclude then, it is very plain, that there needs no more to make Opium prove destructive or a poison, than to take too great a quantity of it: for then it must inflame the stomach, and rarefy the

the blood to such a degree, that the vessels cannot again recover their tone; whereupon apoplectic symptoms, &c. will ensue.

To be convinced of this, I forced into the stomach of a small dog about half a drachm of crude Opium dissolved in boiling water. He quickly vomited it up with a great quantity of frothy spittle; but repeating the trial, by holding up his head, and beating him, I made him retain three or four doses, intermitting between each about a quarter of an hour. When he had thus taken, as I could guess, near two drachms, I watched him about an hour: then he began to sleep, but presently started up with convulsions, fell into universal tremblings, his head constantly twitched and shaking, he breathed short and with labour, lost entirely the use first of his hinder legs, and then of the fore ones, which were stiff and rigid like sticks. As he lay snorting, to hasten his end, I was giving him more of the solution; but on a sudden his limbs grew limber, and he died.

Opening his stomach, I found it wonderfully distended, though empty of every thing but some water and Opium; parcels of frothy mucus swimming in it: the inside was as clean as if scraped and washed from all the slime of the glands, with some redness here and there, as in a beginning inflammation. The pylorus was contracted. The blood-vessels of the brain were very full: and I took out a large grume of concrete blood from the upper part of it, cutting into the sinus longitudinalis, as is not uncommon in apoplectic carcases; but found no extravasated serum in the ventricles, nor among any of the membranes.

As to the cure in such cases; besides emptying by vomiting, bleeding and blistering, acid medicines and lixivial salts are the proper remedies. These contract the relaxed fibres, and by their diuretic force make a depletion of the vessels. I have particularly, with extraordinary success, given repeated doses of a mixture of salt of wormwood with juice of lemons. This is the foundation, upon which Van Helmont prepared his laudanum cydoni-

atum, and Starkey his pacific pill. Generous wine, which the antients gave for an antidote, can be no other ways useful, than as it dissolves the refinous clammy part of the stomach, and so forwards its expulsion by other helps, which cause a contraction of the muscular fibres.

AS an Appendix to this discourse, I shall subjoin an account of another poison, very different from any we have described, but nearly related to those called narcotic.

This is the simple water distilled from the leaves of the *Laurocerasus* or common laurel: the bad effects of which were first observed some years since in Ireland; where, for the sake of its flavour, it was frequently mixed with brandy.

A small quantity of this killed two women, who drank it, very suddenly. Hereupon a learned physician, surprized at the event, (this plant having never been thought to be any ways noxious) made several experiments with it upon dogs, which were afterwards, some of them, repeated here, with the same fatal success^a.

From all these, but more particularly from observations communicated to me by Dr. Nicholls, (which he had made in his anatomical lectures) I shall give a short description of the appearances in the animals put to death in this uncommon way.

All the dogs fell immediately into totterings and convulsions of the limbs, which were presently followed by a total paralysis, so that no motion could be excited even by pricking or cutting them.

No inflammation, upon dissection, was seen in any of the internal membranes. The most remarkable thing was, a great fulness and distension of the veins, in which the blood was so

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fluid,

^a Vid. Philosoph. Transact. N^o 418 and 420.

fluid, that even the lymph in its vessels was generally found tinged with red.

The same water, injected, as a clyster, into the intestines, had always the like effects, in a very few minutes.

To make the manner of acting of this poison more evident, Dr. Nicholls prepared a quantity of it much stronger than ordinary, by cohobating, (as the chemists call it) or distilling it twice from fresh leaves. By this proceeding he had about a drachm of a heavy oil, of the colour of olive oil, subsiding at the bottom of about three pints of water: this, by frequent shaking, was quite incorporated again with the water.

About two ounces of this killed a middle-sized dog, in less than half a minute, even while it was passing down the throat.

I do not know a more convincing proof of what I have all along affirmed, that all poisons act principally upon the nervous fluid, than this seemingly innocent water gives us. That a simple liquor, without any extraordinary sensible qualities, should even in its passage into the stomach, nay when thrown into the lower guts as a clyster, instantaneously kill, and that without any marks of inflammation or corrosion, can no other way be accounted for, but by an immediate effect upon the animal spirits.

If what I have, in the Introduction, conjectured concerning the nature of the nervous fluid, be right; the elastic matter, which enters into its composition, must in the membranes suffer a repulsion from some active particles in this water: (as we see in many experiments of electricity, it is in this manner affected by several bodies meeting with it) in consequence of which, the nerves, first of the membranes which it touches, and then of all the organs, must lose their action. Hence it is that animals killed this way, after strong convulsions, die universally paralytic: and a sudden stop being put to the circulation, the blood remains in perfect fluidity in the veins.

More will be said to this purpose in the following Essay. I shall only add here, that the deadly power of this water seems to

be intirely owing to its being over-saturated with that heavy oil, which we have mentioned: and therefore Dr. Nicholls experienced, that ten drops of a red oil, (like to this, of a kernelly flavour and taste) distilled in the same manner from bitter almonds, (after the sweet oil had been expressed) mixt with an ounce of common water, in like manner, killed a dog in about half an hour.

Considering all this, and that it would be a confirmation of what I have asserted, if the application of such substances, as draw back the spirits to their membranes, should, by an irritating force, contrary to the repelling liquor, revive the dying animal; we gave to a small dog about an ounce of strong laurel-water. He fell immediately into most violent convulsions, which were soon followed by a total loss of his limbs. When he seemed to be expiring, we held to his nostrils a phial of good spirit of sal ammoniac, and forced a small quantity of the same down his throat: he instantly felt its virtue, and, by continuing the use of it for some time, by degrees recovered the motion of his legs; and, in about two hours, walked about with tolerable strength, and was afterwards perfectly well.

The antidote shews the nature of the poison; and I make no doubt but the same will prove effectual against any others of this kind, which, without an inflaming quality, stupefy, and stop the motion of the nervous fluid.

I give this hint, because it is well known, that the kernels of some fruits, particularly of black cherries, afford by distillation a water, in taste and smell, not unlike to that from laurel or bitter almonds: which, if drawn off very strong, or over-impregnated with the heavy oil, may certainly cause the like bad symptoms. Some trials, as I am informed, have proved this to be so. Upon this account, I think our shops had better be without this water; especially since it is not known to have any medicinal virtue, and is commonly given to infants, easily affected, and subject to convulsions, the very disorder, which waters of this kind have been found to produce.

ESSAY VI.

OF VENOMOUS EXHALATIONS from the EARTH, POISONOUS AIRS, and WATERS.

BESIDES these already treated of, there is yet another way of being poisoned, and that is by venomous steams and exhalations, or a poisonous air taken into the body by the breath.

This is notorious enough, and authors upon many occasions make mention of it ; but when they come to explain the particular manner how this kills, they most commonly reduce it to some of the poisons, which prove destructive by being admitted into the stomach : alledging that malignant fumes and airs are therefore fatal, because impregnated with arsenical, mercurial, and the like hurtful *μιάσματα* or particles, they convey these into the body ; which being of a very corrosive nature, must necessarily do hurt both to the fluid and solid parts.

And indeed that the fumes of these same minerals are very pernicious, and air filled with their atoms very unfit for respiration, is most certain ; but to argue from hence, that all deadly vapours and malignant airs owe their mischief to these only, is too fond and ill-grounded a conceit : since upon a due inquiry it will appear, that there may be, and are, mortiferous exhalations from the earth, infecting the air, of a nature so different from any of those poisons ; that the very substance, from which
they

they arise, may not be at all hurtful, though taken into the stomach itself.

Venomous steams and damps from the earth the Latins, in one word called Mephites ^a.

This, as many other Tuscan words, comes from a Syriac theme, which signifies to blow or breathe ^b. And in ancient times several places were remarkable for them : so the Mephitis of Hierapolis was very famous, of which Cicero, Galen, but more particularly, and from his own sight and knowledge, Strabo ^c makes mention.

Such another was the Specus Corycius in Cilicia, which, upon the account of its stinking deadly air, such as is thought to proceed from the mouth of dragons, which the poets give to Typhon, was called Cubile Typhonis. This Pompon. Mela ^d describes ; and it is indeed as antient as Homer ^e : for Arima, in which he places it, was, as Eustathius observes, a mountain of Cilicia.

Neither are such fumes as these now infrequent ; and though mostly found in mines, pits, and other subterraneous places, yet they are sometimes met with on the surface of the earth too, especially in countries fruitful of minerals, or pregnant with im-bowelled fires : such are Hungary and Italy, which latter, as Seneca ^f takes notice, has always been remarkable for them.

I shall therefore, having had the opportunity of making some remarks upon one of the most famous of all in those parts, give as good an account as I can of that, and its manner of killing ; which though I dare not affirm to be applicable to every Mephitis, yet seems plainly to be the case of most of them : and
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^a Virgil. *Æn.* vii. v. 84. ———— *Sævamque exhalat opaca mephitim.*
Vid. Servium, *ibid.*

^b Scaliger, *Conject.* in Varron. ^c Lib. xiii. ^d De Situ Orb.
lib. i. c. 13.

^e *Εἰν Ἀρίμῳ οὗτι φασὶ Τυφάεος ἔμμεναι ἐνός.* Il. β. ver. 783.

^f Nat. Quæst. l. vi. c. 28.

where it is not, this simple mischief will only be found to be complicated with another ; and then some extraordinary symptoms, or appearances in the animals killed, will easily make a discovery of the additional venom and malignity.

This celebrated Mofeta, taken notice of (or at least some other hereabouts) even in the time of Pliny^a, is about two miles distant from Naples, just by the Lago d'Agnano, in the way to Pozzuolo or Puteoli, and is commonly called la Grotta de' Cani : because the experiment of its deadly nature is frequently made upon dogs ; though it be as certainly fatal to any other animal, if it come within the reach of its vapour. For Charles the eighth of France proved it so upon an ass ; and two slaves put into it by order of D. Pietro di Toledo, viceroy of Naples, with their heads held down to the earth, were both killed^b.

It is a small grotta at the foot of a little hill, about eight feet high, twelve long, and six broad. From the ground arises a thin, subtle, warra fume, visible enough to a discerning eye, which does not spring up in little parcels here and there, but is one continued steam, covering the whole surface of the bottom of the cave ; and has this remarkable difference from common vapours, that it does not, like smoke, disperse itself into the air, but quickly after its rise falls back again, and returns to the earth ; the colour of the sides of the grotta being the measure of its ascent : for so far it is of a darkish green, but higher only common earth, and this is about ten inches. And therefore as I found no inconvenience by standing in it, so no animal, if its head be kept above this mark, is in the least injured. But when (as the manner is) a dog, or any other creature, is forcibly held below it, or by reason of its smallness cannot hold its head above it ; it presently, like one stunned, loses all motion, falls down as dead, or in a swoon, the limbs convulsed and trembling, till at last no more sign of life appears, than a very weak and almost insensible beating of the heart and arteries : which, if the animal be

^a Nat. Hist. lib. ii. c. 93.

^b L. di Capoa delle Mofet. p. 37.

be left there a little longer, quickly ceases too; and then the case is irrecoverable, as in one perfectly strangled. But if it be taken out in time, and laid in the open air, it soon comes to life again; and sooner, if thrown into the adjacent lake, which by constringing the fibres of the skin, in the manner of a cold bath, puts the blood again into its circulation.

It will afford some light towards the knowledge of the nature of this fume, to mention some other experiments made in the grottaⁱ. A lighted torch, snuff and all, goes out in a moment, when dipped into the vapour.

A pistol cannot take fire in it. If a weather-glass be so fixed in the grotta, that the stagnum is wholly covered with the vapour, the quicksilver neither falls nor rises otherwise than in the outward air.

In this short, but accurate history of this grotta, I have set down those particulars, which not only distinguish mephitical exhalations from common and innocent fumes, but also give hints sufficient, I think, to determine the reason and manner of their surprising effects.

And not to spend time in refuting the opinion of others, I first take notice, that here can be no suspicion of any such poison as we have described: if there was, animals taken out of the grotta could not so immediately recover from the effects of it, without any remaining appearance of faintness and sickness, or such symptoms as are suffered from inspiring air impregnated with corrosive effluvia; and these would certainly, in some degree at least, infect the air in the upper part of the cave, which is always pure and fit for respiration. Neither could a mischief of this kind be produced, without some marks of it in the creatures killed, when opened: which yet discover nothing extraordinary, either in the fluid or solid parts, except what I shall presently mention in frogs.

In

ⁱ Addison's Remarks on Italy, p. 230.

In order therefore to understand wherein this deadly power consists, it must be observed, that the use of respiration is twofold; the first, that the blood, in its passage through the lungs, may by the elasticity of the air, distending the vesiculæ, and thus pressing upon the arteries*, be comminuted and broken, so that no cohesion of its parts may hinder the secretion of those humours, which in the several glands are to be derived from it: the other is, that the blood may be supplied with something from the air, whatever it be, necessary to life.

That there is a vivifying matter from the air, which passes into the blood by the breath, I have in another place¹ demonstrated by observing, that the same quantity of it will not suffice long for breathing, though it be deprived of none of those qualities, by which it is fitted to inflate the lungs, and agitate the blood. And likewise, from the experiment of Dr. Halley, who, when several fathom under water, in his diving engine, breathing an air more condensed than the natural, found that he drew his breath more slowly than usual: the reason of which must be this, that when a greater quantity of air than ordinary was taken in at a time, and consequently the blood furnished with more of those particles, which are necessary to be mixed with it, a less frequent respiration sufficed.

The case being thus, since (as we have mentioned) the mercury in the barometer is not altered in its ascent by this vapour, that is, there is no want of gravity and elastic pressure in it, at least not to a considerable degree; we must conclude, that there is some quality in it, which, when it is drawn into the lungs, prevents and stops the usual communication of the enlivening spirit from the air to the blood.

We have already taken notice, that there can be no real poison here. All that is discovered by the earth from which the
fume

* Vid. Malpigh. De pulmon. & Bellin. Opuscula. Plague. 9th Edit. p. 45.

¹ Discourse on the

fume arifes, is no more than that it is of a greenish colour, with a fubacid tafte, very much (as L. di Capoa obferves) like to that of the phlegm of vitriol: fo that it may very well be called an unctuous vapour, of the vitriolic kind, raifed by a fubterraneous heat.

It is certainly neceffary to the inflation of the pulmonary veficulæ, and the fubfequent entrance of the fubtile matter from the air into the blood, that the nervous liquor fhould have a free courfe into them: it is therefore highly probable, that thefe vitriolic particles in the fume have a counteraction or repulfive force to the elastic matter of this liquor; by means of which the fibrillæ, into which it fhould pafs, being deftitute of it, become quite relaxed and lofe their force ^m.

Neither muft it feem ftrange, that the animal fpirits fhould be fo fuddenly interrupted in their action, by the interpoftion of a ponderous fluid; fince we fee every day how instantaneoufly, on the other hand, their motion is quickened and revived by the application, to the noftriis, of volatile falts: and it may be obferved, that thefe are always alkaline, that is, of a nature quite oppofite to vitriolic or acid fpirits, fo as readily to fall into a conflict or fermentation with them.

To conclude this part of our difcourfe; I think it a fufficient confirmation of this reasoning, that in frogs killed in this grotta, the bladders of the lungs (more vifible otherwife and diftinct in thefe creatures than in moft other) were found fubfided and quite empty of air ⁿ. But if any one defires a farther proof, he may, according to thefe principles, make, as L. di Capoa did ^o, an artificial Mephitis: for if antimony, bismuth, or any other fuch mineral, be finely powdered, and moiftened with aqua fortis, or fpirit of nitre; there will arife a great heat, with a thick dark fmoke, in which, as in this grotta, torches are extinguifhed, and animals, though but flowly, ftifled and killed.

T

The

^m Vid. Effay V. at the end. ⁿ L. di Capoa, Mofet. p. 40. ^o Ibid. p. 128.

The mortal effects of subterraneous damps, in mines, deep wells, and the like close places ; as also of the fumes of confined burning charcoal, may be accounted for in the same way : these being generally acid exhalations from mineral substances ^p. And as in an animals, which have died in the described grotta, the vesicles of the lungs are found subsided, wanting due tension from the animal spirits ; so in the dissection of a man killed by the vapour of wood coals, carried from a baker's oven into a deep cellar, as the story is related in the Memoirs of the Royal Academy at Paris ^q, the brain appeared dry, and the muscles of the arms and thighs so relaxed, that they seemed separated from the parts, to which they belonged.

But it must here be observed, that, in some cases of this nature, the mineral particles are mixed with so small a proportion of water, that, instead of extinguishing a flame, they will themselves, like gunpowder, take fire, and burn at the approach of a candle. A famous instance of such a vapour is given in our Philosophical Transactions ^r : and an experiment, made by a mixture of oil of vitriol and filings of iron, confirms the truth of our reasonings on this head.

Thus I have shewn how death may enter at the nostrils, though nothing properly venomous be inspired. It might perhaps be no difficult matter to shew, how a lesser degree of this mischief may produce effects, though seemingly very different from these now mentioned, yet in reality of the same pernicious nature : I mean, how such an alteration of the common air, as renders it in a manner mephitical, (which is done by too much heat, and at the same time too great a proportion of watery and other grosser particles mixt with it) may be the cause of epidemic diseases, and, it may be, more especially of those, which, by reason of their untoward symptoms, are usually called malignant.

For

^p Vid. Philos. Transf. N^o. 411. & 429.

^q Ann. 1710. p. 17.

^r N^o. 442.

For it is very remarkable, that Hippocrates^s observed the constitution of the air, which preceded pestilential fevers, to be great heats, attended with much rain and southern winds: and Galen^t takes notice, that no other than a moist and hot temperament of the air brings the plague itself; and that the duration of this constitution is the measure of the violence of the pestilence. Lucretius^u is of the same mind: for in his admirable description of the plague of Athens, “ These diseases (says he) either come from the air, or arise from the earth,”

{ ——— *Ubi putrorem humida nacta est*
{ *Intempestivis pluviisque & solibus icta.*

In short, the general histories of epidemic distempers almost constantly confirm thus much; and would have done it more, if the vain notion of occult venoms had not prepossessed the minds of authors, and made them regardless of the manifest causes.

And this is notorious enough in those countries, where malignant diseases are most rife: thus it is a very common observation in the East-Indies, that during the dry heats the season is healthful, but when the rains fall immediately upon the hot weather, then untoward fevers begin to threaten.

The same is observed in Africa: for (as Joan. Leo^x relates) if showers fall there during the sultry heats of July and August, the plague and pestilential fevers ensue thereupon, with which whosoever is infected hardly escapes.

Whoever reflects on what has been said of the use of respiration, and considers the propositions of Bellini, will easily understand the reason of these events.

This great demonstrator has proved, that malignant and pestilential fevers are owing to a viscid and tenacious lentor or slime,

T 2

which

^s Epidem. lib. ii. & iii.

^t De temperament. lib. i. c. 4. & Commentar.

in epidem. lib. iii.

^u Lib. vi. ver. 1099.

^x Hist. Afric. lib. i. c. 1.

Vid. Purchas's Pilgrims, book vi. c. 1. Dapper, Descriptio Afric. p. 127.

which first obstructs the capillary arteries, and afterwards, being dissolved by heat, ferments with the blood, and changes it to a mass unequally fluid and glutinous.

Now it is plain, that air, together hot and moist, not having force sufficient to comminute the arterial fluid in the lungs, this, when it arrives at the secretory organs, will, instead of deriving into them their proper liquors, leave its most viscid parts sticking about their orifices, which by degrees make obstructions. These can only be removed by the impetus of the succeeding blood, and the agitation of heat: and then this slimy mucus, being again taken into the circulation, will, in the nature of a ferment, disturb the whole mass, and alter its natural properties.

I very well know, that the authority of Hippocrates is brought to support the fancy of a latent ærial poison in some of these distempers: his *Θείον τι* (something divine^y) is construed in this sense. But his best interpreter, Galen, understood by this expression no such thing as they mean: on the contrary, he says it is a manifest constitution of the air, prevailing unseasonably, such as himself has described in his Aphorisms^z; and which is the same with that of which we are discoursing.

Minadous^a therefore rightly remarks, that, in his whole epidemics, Hippocrates never once mentions any venom as the cause of malignant diseases; and, as to any thing really divine, the wise old man in other treatises^b expressly teaches, “That
“ no disease comes from the gods, one more than another, each
“ acknowledging its own natural and manifest cause.”

But it is foreign to our purpose to enlarge on this subject. I shall only hint, that physicians ought therefore to be very cautious in giving, as they often do, in cases of this nature, under the notion of Alexipharmacs, such medicines as raise a great heat both in the stomach and blood. Having engaged the animal spirits in war with malignities, they too often send treacherous auxiliaries

^y Vid. Prognostic. & Galen. Comment.
febre malign. lib. i. c. 8.

^z Sect. iii. Aph. 11. ^a De
^b De ære, aquis & locis. & De morbo sacro.

auxiliaries to the supposed weak party; and, by exciting new tumults and disorders, check and interrupt the work of nature, which always endeavours to conquer its enemy by critical discharges.

It must indeed be owned, that some malignant fevers are contagious, and that contagion is a real poison: but the original cause of a disease, and the communication of it, are very different things. Of this I have largely discoursed on another occasion: I shall therefore only hint here, that when a fever is communicated by way of infection from one already diseased, this most commonly happens at the latter part of the distemper; that is, (as was observed in the *Hydrophobia*) when the fermenting blood is throwing off great quantities of its active particles upon the glands of the most constant and easy secretions: such are those in the surface of the body and the mouth. These therefore being by the air drawn into the lungs of a sound person, and likewise insinuating themselves into the pores of the skin, will affect first the nervous fluid, and then the blood, and produce the like fermentation and disorder, which had been bred in the body from which they arose.

The way, by which bad food, ill ripened fruits of the earth, &c. do often produce malignant and pestilential diseases, is not very different from that, by which we have observed unwholesome airs to be the cause of the like effects. For the juices, with which those supply the blood, being corrupted, must necessarily make a fluid neither fit for nutrition nor the animal secretions: and it is therefore no wonder, if, besides the other symptoms ensuing, sore pustules, inflammations, ulcers, &c. (more common in fevers from this cause than in any other) are raised in the surface of the body.

It is upon this account, that a famine is very often succeeded by a pestilence. And this calamity generally begins among the poorer sort of people, whose diet to be sure is the worst.

It

It is a constant observation in countries subject to the plague, as Turkey and Africa, that when the common inhabitants die in great numbers, foreigners who live in plenty, if they avoid communication with the infected, escape the danger.

Thus much concerning poisonous exhalations and airs, so far as the consideration of the grotta de' cani has led us on to enquire into their effects. For though there may be other alterations of this same element, differing in their nature from this we have insisted upon, and yet equally pernicious and hurtful; yet we take no notice of any of them, in regard that those, which are from the arsenical, mercurial, and the like fumes, are reducible to a foregoing Essay: and those, which are owing to a change of the known properties of the air, may be easily explained, by what has been already delivered in this. I shall therefore rather chuse to make some remarks on the mischief of another fluid, which as it is the next in use to this we have been treating of, so the bad qualities of it, when it comes to be altered, must necessarily be almost equally fatal and dangerous.

I mean water, which is of so constant service, not only for our drinks, but also in preparing of our flesh and bread, that it may justly be said to be the vehicle of all our nourishment: so that whenever this happens to have other properties than are necessary to fit it for this purpose, it is no wonder if in its passage through the body these make suitable impressions there.

Thus at Paris, where a part of the city is supplied with a water from Arcueil, which is so full of stony particles, that even the pipes, through which it runs, are in time incrusted and choked up; Dr. Lister has observed, that the inhabitants are more subject to the stone in the bladder, than in most other places ^d.

In like manner, let the gross particles, with which the water is saturated, be of any other nature, metallic, saline, &c. these, according to their various gravity, the capacity of canals, and
such

^d Vid. Lister's Journey to Paris.

such like circumstances, will, when they come to circulate in the animal body, be by the laws of motion deposited in one part or other. So those mineral bodies, and nitrous salts, which abound in the snowy waters of the Alps, do so certainly stuff and enlarge the glands of the throat in those who drink them, that scarce any who live there are exempted from this inconvenience.

For this reason, the choice of water for drink among the antients was by weight, the lightest being preferred, as most free from all heterogeneous bodies.

The case therefore of poisonous springs is, their having corrosive corpuscles mixt with their water, which cannot fail, when forsaken of their vehicle in the canals of the body, to do the same mischief as they would, if taken by themselves undiluted: only with this difference, that they may in this form be carried sometimes farther into the animal œconomy, and so, having passed the primæ viæ, discover their malignity in some of the inmost recesses. Thus the fons ruber in Æthiopia, mentioned by Pliny^f, about which abundance of native minium or cinnabar was found, shewed its ill effects chiefly on the brain: and therefore Ovid^g says of it,

— *Si quis faucibus hausit,
Aut furit, aut patitur mirum gravitate soporem.*

}

We shall not need then to enlarge on this matter; since any of the forementioned mineral poisons may thus impart their deadly quality to waters: and accordingly there are instances of arsenical, mercurial, &c. fountains, of which the histories may be seen in the collections of the learned Baccius^h; and one very remarkable in the Philosophical Transactionsⁱ.

But as we before took notice concerning airs, so it may be worth the while to observe of waters; that there are some alterations

^e *Quis tumidum guttur miratur in Alpibus?* Juvenal. Satyr. xiii. ^f Lib. xxxi. c. 2. ^g Metamorph. lib. xv. ver. 320. ^h De Therm. lib. vi. ⁱ Number 8.

terations of them, which though not properly poisonous, yet are of so great consequence in their effects, that they may very well deserve to be regarded.

This I shall do with respect to a great abuse, committed in this kind about the city; and that is, in chusing sometimes stagnating impure well-water for the brewing of beer, and making other drinks. Such a fluid indeed has oftentimes a greater force and aptness to extract the tincture out of malt, than is to be had in the more innocent and soft liquor of rivers: but for this very reason it ought not, unless upon mere necessity, to be made use of; this quality being owing to the mineral particles and aluminous salts, with which it is impregnated.

A late author*, by searching into the first accounts of the distemper we call the scurvy, described by Pliny¹ and Strabo^m, under the promiscuous names of stomacace and scelotyrbe; and examining the authentic histories of it in later years, made by the most observing physicians in those countries, where it was unhappily revived, as Claus Magnus, Balduinus Ronseus, J. Wierus, Solomon Albertus, &c. finds that the origin of it was in all times and places charged upon the use of unwholesome stagnating waters. Then by comparing together the clayey strata of the earth about the cities of London, Paris, and Amsterdam, he shews, that where the water is worst, there this malady is most rife. So that he has put it out of all doubt, that most of the perplexed and complicated symptoms, which are ranged under this one general name, are in a great degree owing to the ill qualities of this element.

And indeed Hippocrates himself, as he has very plainly deciphered this diseaseⁿ, by the title of *σπλῆνες μεγάλοι*, or great spleens; so he does very particularly in another treatise^o take notice,

* Dr. J. H. *Scelera aquarum*: or, a Supplement to Mr. Graunt on the bills of mortality. ¹ Lib. xxv. c. 3. ^m Geogr. lib. vi. ⁿ Prorrhetic. lib. ii. c. 16. ^o De ære, aquis, & locis, sub finem.

rice, that drinking of stagnating well-waters must necessarily induce an ill disposition both of the spleen and belly.

If we enquire into the reason of such ill effects, we must consider, that clay is a mineral glebe, and that the gross particles and metallic salts, with which waters passing through such a bottom abound, are, as Dr. *Lifter* ^r, observes, not to be mastered; that is, indigestible in the human body. Not only therefore will these cause, as he very well argues, calculous concretions in the kidneys, bladder, and joints, and as Hippocrates experienced, hard swellings in the spleen; but they must necessarily oftentimes by their corrosive quality twitch and irritate the sensible membranes of the stomach and bowels, and thus hinder and interrupt the digestion of our food. Nay, besides all this, when they come into the blood, it is no wonder, if the small canals of insensible perspiration are frequently stopt and obstructed by them: for it is upon this score that Sanctorius ^a teaches us, “that heavy water converts the matter of transpiration into an ichor, which being retained induces a cachexy.”

What mischiefs will ensue hereupon, every one sees; not only pains in the limbs, livid spots in the surface of the body, ulcers, &c. from the acrimony of the undischarged moisture; but many besides of those nervous complaints, which go by the name of hysterical and hypochondriacal, may take their rise from the same source: for the before cited Sanctorius ^r has remarked, that the flatus or wind, so inseparable from those cases, is no other than “the fluid of perspiration rude and unfinished.”

If these inconveniences are oftentimes not felt, at least not till towards the declining age, in strong and active habits of body; yet I am, from very good experience, assured, that they deserve consideration in weaker constitutions, and a sedentary life, especially of the more tender sex.

U

For

^r De fontib. med. Angl. p. 2. pag. 75. At fossilia sive metallica salia alia atque alia sunt, & nobis & pene igni dixeram indomabilia. ^a Medic. Static. §. ii. Aphor. 6. ^r Ibid. §. 3. Aph. 13. Flatus nil aliud est quam rude perspirabile.

For these reasons Pliny ^s tells us, “ that those waters are condemned in the first place, which, when boiled, incrustate the sides of the vessels.” And that our well-waters do this, no body who looks into the common tea-kettles, can be ignorant.

And indeed in antient times, as that part of medicine, which relates to diet, was more carefully studied, than it is now; so this point particularly, of which we are treating, was of so great moment, that Hippocrates, who wrote the best book ^t on the subject that ever was published, has in a great measure accounted not only for the diseases, but even for the temper and disposition of the people of several countries, from the difference of their airs and waters.

^s Lib. xxxi. c. 3. *Damnantur imprimis fontes, quorum aquæ decoctæ crassis obducunt vasa crustis.* ^t *De ære, aquis, & locis.*

The explication of those Figures, which are not explained in the Treatise.

T A B L E III. The Scolopendra.

FIG. 1. *a a*. The claws of the poisoning forceps.

Fig. 2. One of the claws magnified, in which appears the aperture *b*.

Fig. 3. The Scorpion. *a a*. The claws. *b*. The tail with the sting at the end.

Fig. 4. The sting magnified, to shew one of the slits, out of which issues the poison *a*.

Fig. 5. The Tarantula. *a a*. The wounding forceps. *b b*. The feelers.

T A B L E IV.

Fig. 1. The upper part of an expanded leaf of the lichen. *a a*. The peltæ or seminal capsulæ, at the extremities of the leaves.

Fig. 2. The under side of the same leaf, with the peltæ.

Fig. 3. A view of a leaf, as it lies on the ground unexpanded.

Tab:III.

Fig. 4.

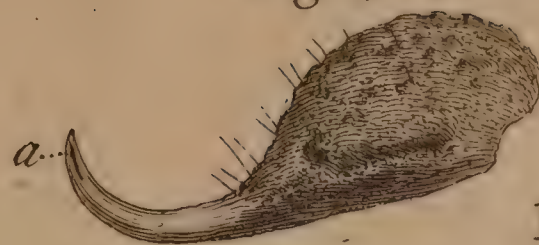


Fig. 1.

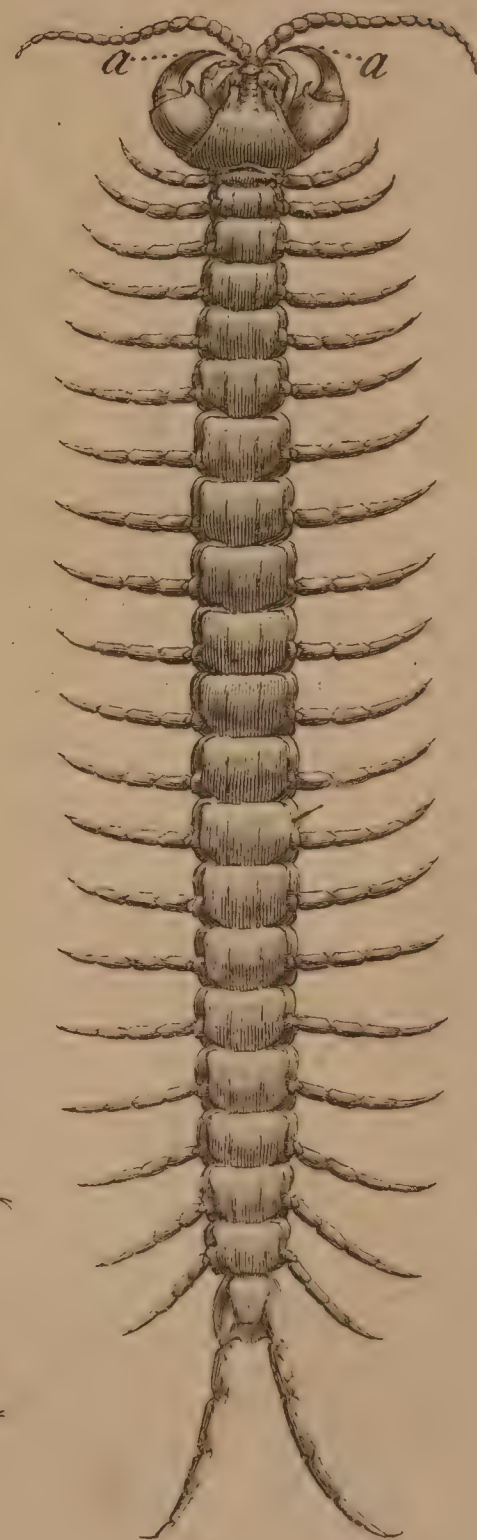


Fig. 3.

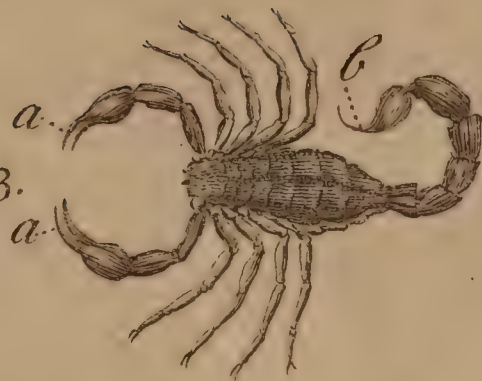
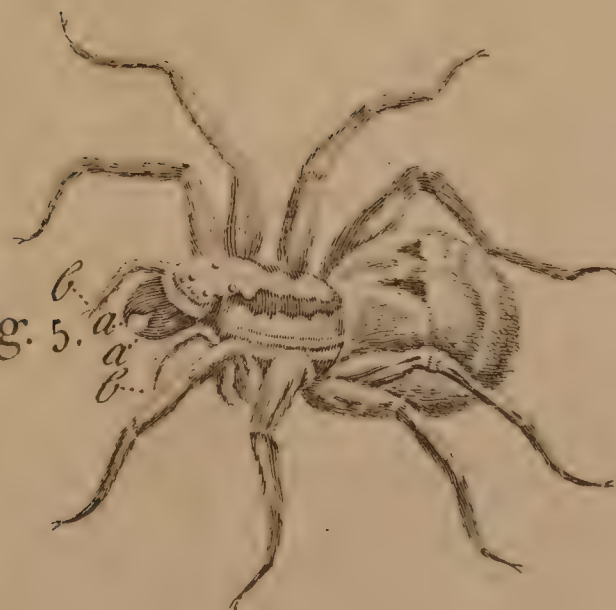


Fig. 2.



Fig. 5.



Tab:IV.

Fig.1.

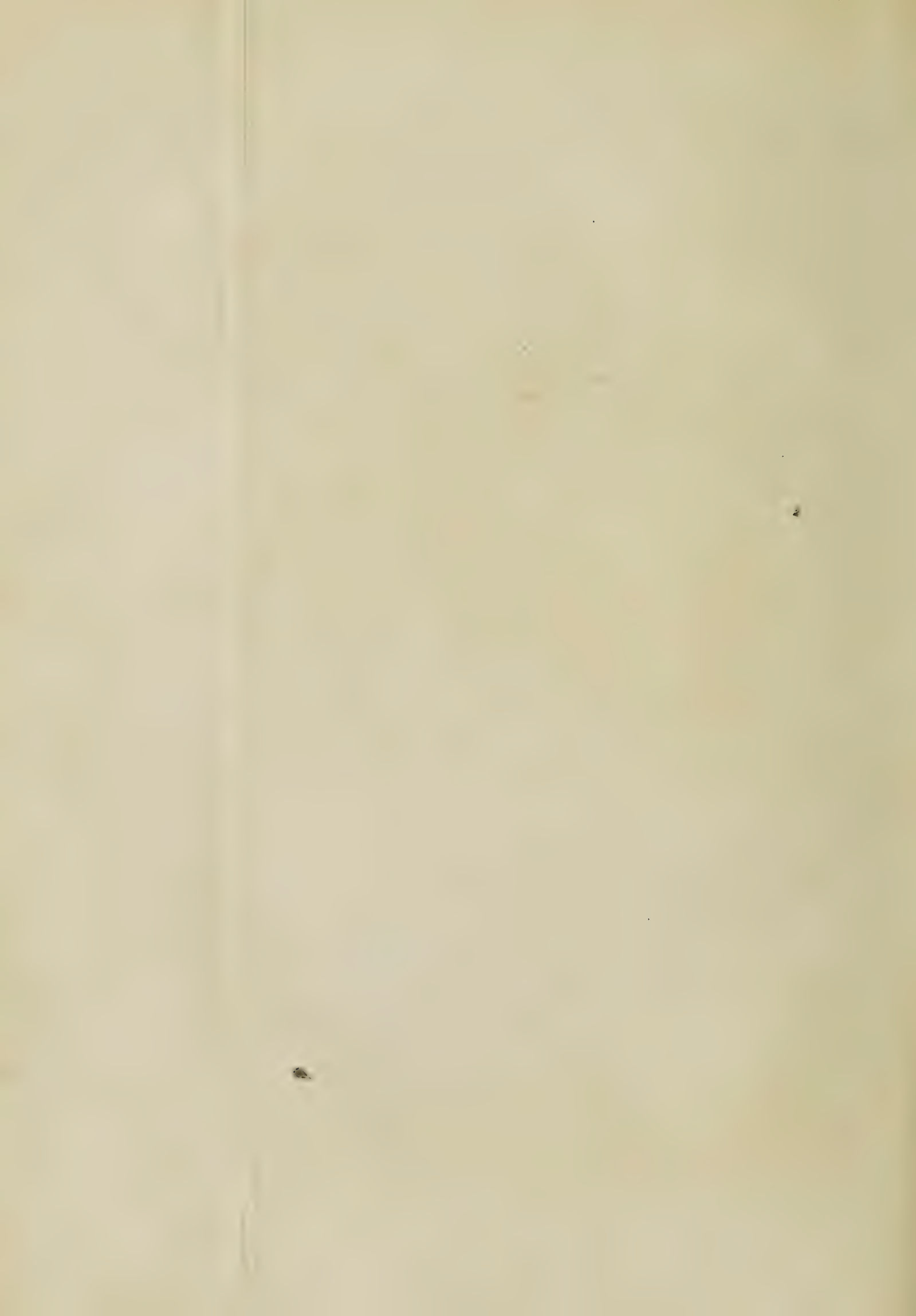


Fig.2.



Fig.3.





A

T R E A T I S E

Concerning the

I N F L U E N C E

O F T H E

S U N and M O O N

U P O N

H U M A N B O D I E S,

A N D

The DISEASES thereby produced.

ADVERTISEMENT.

HAVING resolved, at the instance of some friends, to give a second edition of this small Treatise, I thought it incumbent on me, to read it over attentively ; in order to make such additions and improvements, as above forty years experience might have suggested to me since its first publication. Accordingly, in this review, I have explained some mathematical matters in a clearer manner than I had formerly done ; and I have illustrated and confirmed the medicinal part by several additional observations and cases, which may prove useful in the practice of physic. And indeed, that a due consideration of this subject is extensively useful to a physician, will appear with sufficient evidence, from the various kinds of diseases, the courses and returns of which I have herein shewn to depend on the different positions and revolutions of the Sun and Moon. Now, though a previous acquaintance with the mathematical principles of natural philosophy be requisite for comprehending this subject in its full extent ; yet as those, who are little affected

clii A D V E R T I S E M E N T.

affected by geometrical demonstrations, may possibly be convinced by a number of facts, I shall not, with respect to this little work, insist on that saying of Plato:

ΟΤΑΕΙΣ ΑΓΕΩΜΕΤΡΗΤΟΣ ΕΙΣΙΤΩ.

Let none unskilled in geometry enter here.

London,
July 1. 1746.

P R E-

P R E F A C E.

AS the study of phyfic has in all ages undergone various changes, according to the different opinions of philosophers ; I have often wondered, how it comes to pass, that, notwithstanding the considerable advances made in the study of nature by the moderns, especially in the last century, this useful art has not received those benefits, which might reasonably be expected from a surer method of reasoning, than men were formerly acquainted with. That some of the moderns, particularly Galilei, Kepler, Torricelli, and Sir Isaac Newton, have made vast improvements in natural philosophy, by joining mathematical reasonings to their enquiries into nature, is well known to the learned world : and yet medicine still deals so much in conjecture, that it hardly deserves the name of a science. Whether this be owing to the nature of the art, as being incapable of sure principles ; or rather, to the artists, who having got into a wrong track, will not take the pains to return into the right road ; may possibly be a matter of enquiry on some other occasion. In the mean time, in order to prove how beneficial the study of geometry must be to physicians, as well for investigating the causes of diseases, as for finding

proper remedies for them ; I have attempted to explain a very difficult question, concerning the courses and returns of some distempers ; the nature of which is such, that it cannot be thoroughly well handled by any other means.

Thus I am necessitated, in this disquisition, to enter into a few more minute calculations, than a medical subject might seem to require. Wherefore the reader ought to have some knowledge of Sir Isaac Newton's philosophy ; or at least, understand the learned and sagacious Dr. Halley's Theory of the Tides, upon the principles of that great philosopher, as published in the Philosophical Transactions. And those, who have no taste for mathematical studies, may, if they please, pass over this part of the work. For my part, I never expect to acquire reputation by algebraical calculations, thoroughly sensible of the mediocrity of my genius in that branch of learning. But I flatter myself, that these sheets will be found to contain some histories and instructions, from which even those, who despise all reasoning in physic, and rely on experience alone, will reap benefit in practice : which indeed is the main design of this little Treatise.

The field is large, in which we run our career ; nor are the innumerable evils, with which we are daily surrounded, to be remedied by any one method. The two great pillars of medicine are experience and reason ; and he that has no confidence in the latter, at least bids the fairer towards relieving the sick, in proportion

to

to his stock of the former. But yet the business of our profession requires the joint assistance of both ; because a rational theory will teach a man to apply his experimental knowledge to the various cases that occur.

For although a very few remedies, found out by chance, and confirmed by use, might possibly have been sufficient for curing the disorders of men in the earliest times, who, we are told, led sober and active lives ; yet in succeeding ages, when their constitutions had been injured by sloth and luxury, they stood in need of different methods of cure : inasmuch as it now became necessary to enquire, not only into the cause of the distemper, but also how its nature and usual appearance had been changed in this or that individual. Hence that saying of Hippocrates ^a : The physician should have an eye to things common and peculiar : because, as Celsus rightly observes, there are cases, in which the same disorder puts on a different appearance from that, which it usually has ; and the discovery of the cause is sometimes the cure of the distemper ^b.

And it is probable, that the only reason, why the profession of physic lay buried in total darkness for near near five hundred years, that is, from the Trojan to the Peloponnesian war, as Pliny has recorded ^c ; was, that, whereas new diseases started up from time to time, and those, who had nothing but experience to make them physicians, were unequal to these new difficulties ; the philosophers engrossed the art, which

^a Epidem. lib. i.

^b In præfat.

^c Lib. xxix. in præm.

was found to be lame and infirm without the knowledge of nature. Thus Celsus says of that space of time, that the science of physic was accounted a part of philosophy; so that the curing of diseases, and the contemplation of nature, took their rise from the same persons ^d.

Now, as it is of consequence to the subject in hand, so it is easy to prove, that those philosophers, who laid the first foundations of our art, were really famous geometricians. And first, the most eminent among the sages of antiquity was Pythagoras, who had acquired such high reputation for his skill in physic, that it was commonly said, that he travelled, not so much for the sake of instructing people, as of curing them ^e. But the progress made by him in mathematical studies also was extraordinary. Witness his two noble discoveries; the one, Of the square described upon the side subtending the right angle in a right-angled triangle, being equal to both the squares described upon the sides containing the right angle; the other, Of the area of the parabola, which, according to Proclus ^f, he first demonstrated. For the first of these problems, Athenæus ^g and Diogenes Laertius ^h, upon the authority of Apollodorus the arithmetician, say, that he offered a hecatomb in sacrifice. But Plutarch ⁱ, after citing a verse of Apollodorus, leaves it doubtful

^d Loco citato.
ad primum Euclid.
lib. viii. segm. 12.

^e Ælian. var. Hist. lib. iv. cap. 17.

^g Lib. x. pag. 418.

^f Lib. iv.

^h In vita Pythagoræ,

ⁱ Quod ne vivere jucunde quisquam possit, qui sectam sequatur Epicuri.

doubtful for which of the two he made that offering.

Empedocles was his disciple in Italy, a person of a vast genius, who, having penetrated into nature's inmost recesses, performed such great things in our profession, as were not to be expected from a bare experimental knowledge of physic. For when his native city Agrigentum was infected with a dreadful plague, he soon found out the cause; and thereupon by stopping up some openings in the mountains, through which unwholesome winds issuing brought the contagion, he averted the evil^k. He rendered the same service to the Selinuntians: for when they were seized with a plague from the corruption and stench of the stagnating waters of a river, which surrounded the city; he ordered two neighbouring rivers to be conveyed into it: by which means, having made a current, and cleansed the channel, the waters gradually grew sweet, and the plague ceased^l. Now these facts are the more worthy of being recorded; because the ancients were generally of opinion, that pestilence proceeded from the anger of the gods, and therefore was not to be cured by natural remedies: whereas in both these cases, the remedies were pointed out by mechanical reasoning; and that calamities of this kind are owing to such causes, is confirmed by a great number of observations published by various authors.

Demo-

^k Idem, de curiositate, & Lib. contra Coloten. Laert. lib. viii. segm. 70.

^l Vid. Diog.

Democritus, who is thought by some to have been Hippocrates's master, was equally famous for geometry and physick. For he is said to have written, among other things, Of the contact of the circle and sphere; Of geometry; Of incommensurable lines: as also, Of the nature of man; Of the humors; and, Of plagues ^m.

By those great men, and others like them, was this profession carried on to the time of Hippocrates; who, as Celsus says, was the first that separated this art from philosophy ⁿ. For he, plainly perceiving, that the superstition of the common people, the impudence and vain pretences of quacks, and the pride and vanity of the sophists, were mighty obstacles to the improvement of the art; proposed to himself in all his writings, to guard against those impediments and difficulties. And accordingly, in his valuable book *De morbo sacro*, he teaches how to obviate false religious notions: and is very copious in detecting the frauds and fallacies of those men, who covered their ignorance with a veil of piety, making profession of charming away those diseases, which they could not cure by medicines. In his books *De arte*, *De decoro*, *De præceptionibus*, he disputes, not only against those, who denied that physick was an art, and therefore had no regard to any thing but experience; but also against those, who practised upon a wrong plan. And because the divine
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^m Idem, in vita Democriti, lib. ix. segm. 46 & 47.
fatione.

ⁿ In præ-

old man is made a tool by contending parties for their respective notions ; I cannot avoid observing, that mechanical reasoning is every where approved and recommended in those treatises by that great parent of medicine. For he says : I praise reasoning, when it is grounded on such principles as fall under our senses, or are proved by experiments ; and draws conclusions from manifest premises. But if it is carried on by unjust deductions, and is built upon fictitious opinions, it occasions great trouble and difficulties °. And this sentiment is illustrated and confirmed in his book *De prisca medicina* : where after saying, that most physicians are very like unskilful pilots, whose ignorance of their art is not discovered, while the vessels sail in good weather before the wind ; but if a storm arise, then it soon appears, that their blunders were the cause of the shipwrecks which happen : he tells us, that our chief care should be to learn the properties of things, not by imagining or contriving, but by finding out the powers, which they are endowed with, and exercise on our bodies ; in which enquiry great regard must be paid both to the qualities of the humors, and to the figures of the parts : some of which from a wide beginning run into a narrow apex, others are more and more expanded ; some are smooth and cylindrical ; some dense or firm, others in fine thin and lax. This is the wisdom, which ought to accompany the study of medicine ; by means of which, he says, the artist becomes equal to the gods ^p.

But

° Lib. de præcept.

^p Lib. de decoro.

But I shall enlarge no farther at present on this theme. However it manifestly appears from what has been hitherto said, that Hippocrates gave the name of Sophists ^a to those, who argued on fictitious principles; and that of real physicians ^r to those, who reason from the laws of nature, and a knowledge of the animal fabric. Which I observe for the sake of those, who, as if there was no difference between the groundless hypotheses of philosophers, and the certain conclusions of geometricians, hold this most useful science in contempt, and even turn it into ridicule before the ignorant multitude. But surely these apply themselves both to philosophy and physic, without having any genius to either; for want of which they cannot discern the wide distance between sophistical opinions and geometrical reasonings. For he, who builds an hypothesis, follows plausibility, and thinks it sufficient, if he can account for appearances from his principles: whereas mechanical theory deals in demonstrations, which the able geometrician deduces either from the figures of bodies, or from the known laws of motion, by necessary consequences.

Examples will set this matter in a clearer light. Des Cartes compiled a set of suspicions and conjectures on the gravity of bodies, and yet made no proficiency thereby in the knowledge of nature: but Sir Isaac Newton, by pursuing its laws in a geometrical manner, without any regard to the cause, laid open to our
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^a Σοφιστὰς.

^r Ἐργῶ ἰσχυρὰς.

contemplation the real fabric of the world. Doctor Willis invented an idea of soporiferous diseases; from which we learn, that the author had words at will, but knew nothing of the nature of those diseases: whereas Bellini, by bringing their history and symptoms under mechanical reasonings, paved the way to the knowledge and cure of those great evils. But enough of this subject.

When I had communicated my intention of publishing this piece to my friend the celebrated Dr. Pitcairne, he not only applauded my design, but, of his great humanity, readily sent me some histories of periodical diseases out of his large stock. Those I have ranged in their proper places, as considerable ornaments to my little book, not without a sense of pleasure, in seeing my opinion confirmed by the testimony of so great a master in these studies; and the rather, because it was proper to produce the observations of others, as well as my own, in support of this new theory. And I may not conceal in this place, that our dissertation displays, not a little, the wisdom, goodness, and wonderful contrivance of the omnipotent Creator of the world; who, while he made ample provision for all living things, established this difference between brutes and rational creatures; that whereas those enjoy the common gifts of nature, he has permitted us, besides, to investigate their properties and uses, and to contemplate the labyrinth of his divine works.

Laſtly, I have but lightly touched upon the cure of the caſes related in this treatiſe ; becauſe I intend, whenever I find ſufficient leiſure, to publiſh the moſt remarkable obſervations, which I have already, or may hereafter make on moſt diſeaſes.

London,
A. D. 1704.

A T R E A-

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T R E A T I S E

Concerning the

I N F L U E N C E

O F T H E

S U N and M O O N

U P O N

H U M A N B O D I E S, &c.

C H A P. I.

That the Sun and Moon cause various alterations in the Human Body, according to their different positions with respect to the earth.

IT was the general opinion of the antient physicians, that some diseases are entirely owing to the influence of the celestial bodies, and that the paroxysms and periods of others are regulated by the action of the moon in particular: wherefore the earliest histories of Epidemics, which have been handed

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down

down to us, are full of the motions and powers of those luminous orbs. Upon this principle it is, that Hippocrates advises his son Theſſalus to the study of numbers and geometry ^a: because, says he, the rising and setting of the stars have a great effect on distempers ^b.

But when in course of time medicine began to be accommodated to the reasonings of philosophers; no body being able to account for the manner of this celestial action, and the rule of observation being gradually laid aside, it was allowed no farther share in affecting our health, than what might be imputed to the changes in the manifest constitution of the air: excepting perhaps something of truth, which still remains disguised and blended with the jargon of judicial astrology.

In order therefore to set this obscure and difficult matter in a little clearer light, I shall in the first place endeavour to shew, that the Sun and Moon, regarding their nearness and direction to the earth only, besides the effects of heat, moisture, &c. thereby caused in our atmosphere, must at certain times make some alterations in animal bodies; then enumerate some histories and observations of such changes, and enquire of what use such thoughts as these may be in the practice of physic.

It is a constant observation of those, who have written the history of the winds, that the most windy seasons of the year are the times about the vernal and autumnal equinox. Every body likewise knows, that in the most quiet weather there is generally some breeze at mid-day and mid-night, as also at full sea; that is, always about the time when the Sun or Moon arrives at the meridian, either over or under our hemisphere. Seamen and country people reckon upon this, and order their affairs accordingly. And the changes of the weather, as to winds or calms, especially about the new and full Moon, are too well known to require any authority to confirm such remarks. Those, who desire a fuller account of these observations, may see it in

J. Goad's

^a Epist. ad Theſſalum,

^b De aëre, aquis, & locis.

J. Goad's *Astrometeorologia* *. These things being matters of fact, and in a manner regular and universal, it may very well seem strange, that philosophers have not been more accurate in their enquiries into the reason of such appearances. True indeed it is, that the origin of winds is various and uncertain ; but however, so constant and uniform an effect must undoubtedly be owing to one necessary cause.

It has been, now a considerable time since, sufficiently made out, that our atmosphere is a thin elastic fluid, one part of which gravitates upon another, and whose pressure is communicated every way in a sphere to any given part thereof. From hence it follows, that if by any external cause the gravity of any one part should be diminished, the more heavy air would rush in from all sides around this part, to restore the equilibrium, which must of necessity be preserved in all fluids. Now this violent running in of the heavier air would certainly produce a wind, which is no more than a strong motion of the air in some determined direction. If therefore we can find any general cause, that would, at these stated seasons, which we have mentioned, diminish the weight or pressure of the atmosphere ; we shall have the genuine reason of these periodical winds, and the necessary consequences thereof.

The flux and reflux of the sea was a phænomenon too visible, too regular, and too much conducing to the subsistence of mankind, and all other animals, to be neglected by those, who applied themselves to the study of nature : however, all their attempts to explain this admirable contrivance of infinite wisdom were unsuccessful, till Sir Isaac Newton revealed to the world juster principles ; and by a truer philosophy, than was formerly known, shewed us how, by the united or divided forces of the Sun and Moon, which are increased and lessened by several circumstances, all the varieties of the tides are to be accounted for. And since all the changes, we have enumerated in the at-
mosphere,

mosphere, do fall out at the same times, when those happen in the ocean; and likewise whereas both the waters of the sea, and the air of our earth, are fluids subject, in a great measure, to the same laws of motion; it is plain, that the rule of our great philosopher takes place here, viz. that natural effects of the same kind are to be attributed, as much as possible, to the same causes^d.

What difference that known property of the air, which is not in water, makes in the case, I shall shew anon. Setting aside the consideration of that for the present, it is certain, that as the sea is, so must our air, twice every twenty-five hours, be raised upwards to a considerable height, by the attraction of the Moon coming to the meridian; so that instead of a spherical, it must form itself into a spheroidal figure, whose longest diameter, being produced, would pass through the Moon. That the like raising must follow, as soon as the Sun is in the meridian of any place, either above or below the horizon; and that the Moon's power of producing this effect exceeds that of the Sun, in the proportion of $4\frac{1}{2}$ to 1 nearly. Moreover, that this elevation is greatest upon the new and full Moons, because both Sun and Moon do then conspire in their attraction: least on the quarters, in that they then drawing different ways, it is only the difference of their actions that produces the effect; lastly, that this intumescence will be of a middle degree, at the time between the quarters, and new and full Moon. The different distances of the Moon in her perigæum and apogæum, likewise increase or diminish this power. Besides, the Sun's lesser distance from the earth in winter is the reason, that the greatest and least attraction of the air upwards more frequently happens a little before the vernal, and after the autumnal equinox. And in places, where the Moon declines from the equator, the attraction is greater and lesser alternately, on account of the diurnal rotation of the earth on its axis.

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^d Newton. Princip. pag. 387.

Whatever has been said on this head, is no more than applying, what Sir Isaac Newton has demonstrated of the sea, to our atmosphere; and it is needless to shew, how necessarily those appearances, just now mentioned of winds, at the stated times, must happen hereupon. It will be of more use to consider the proportion of the forces of the two luminaries upon the air, to that which they have upon the waters of our globe; that it may the more plainly appear, what influence the alterations hereby made must have upon the animal body.

Sir Isaac Newton has demonstrated*, that the force of the Sun to move the sea, is to the force of gravity, as 1 to 12868200. Let this be

$$S : G :: 1 : n. \quad \text{Hence, } S = \frac{G}{n}.$$

And that the force of the Moon to raise the sea is to gravity, as 1 to 2871400. Let this be

$$L : G :: 1 : s. \quad \text{Hence, } L = \frac{G}{s}.$$

And since the centrifugal force of the parts of the earth, arising from its diurnal motion, is to gravity, as 1 to 289; let this be

$$C : G :: 1 : e. \quad \text{Then } C = \frac{G}{e}.$$

Hence,

$$S + L : C :: \frac{G}{n} + \frac{G}{s} : \frac{G}{e} :: \frac{1}{n} + \frac{1}{s} : \frac{1}{e} ::$$

$$1 : \frac{sn}{s+ne} :: 1 : 8123.$$

The same philosopher has taught us, that the centrifugal force raises the water at the equator above the water at the poles, to the height of 85472 feet^f. Wherefore if that force, which is as 8123, raises the ocean to 85472 feet; the united forces of the Sun

* Princip. lib. iii. Prop. 36. & 37.

^f Ibid. lib. iii. Prop. 37.

Sun and Moon, which are as 1, will raise the same to $10\frac{1}{2}$ feet :

$$\text{for } \frac{85472}{8123} = 10\frac{1}{2} \text{ nearly.}$$

Now, we know that the more easily the water can obey the attraction, with the more force are the tides moved : but since, as the sagacious Dr. Halley has determined it, our atmosphere is extended to forty-four miles, whereas the middle depth of the ocean is but about half a mile ; it is plain, that the air, revolving in a sphere about a hundred times larger than that of the ocean, even supposing the whole terrestrial globe covered with water, will have a proportionably greater agitation. Besides rocks, shelves, and the inequality of shoars are a great stop to the access and recess of the sea : but nothing repels the rising air, which is also of such thinness and fluidity, that it is easily driven, and runs every way.

Nor ought we to omit, that it is the universal law of bodies attracted, that the force of attraction is reciprocally as the squares of their distances ; so that the action of the Sun and Moon will be greater upon the air, than upon the water, upon the account of its nearness. But the consideration of the elasticity is still of greater moment here ; of which this is the nature, that it is reciprocally as the pressure : so that the incumbent weight being diminished by the attraction, the air underneath will upon this score be mightily expanded. True it is indeed, that this pressure diminishes gradually, in such sort, that it is of no moment beyond a certain distance from the earth : but yet a small alteration therein produces a very considerable effect ; because thereby our ambient air the more readily yields to the attractive faculty.

These and such like causes will make the tides in the air from the Moon's attraction, to be much greater than those of the ocean. Nor is it necessary to our purpose to determine, by nice calculations, their particular forces : it is sufficient to have proved,

proved, that these motions must both be universal, and also return at certain intervals.

Now, since the raising of the water of the ocean to ten feet and a half, produces torrents of such a prodigious force; we may easily conceive what tempests of winds, if not otherwise checked, the elevation of the air much higher, perhaps above a mile, will necessarily cause. And there is no doubt to be made, but that the same infinitely wise being, who contrived the flux and reflux of the sea, to secure that vast collection of waters from stagnation and corruption, which would inevitably destroy all the animals and vegetables on this globe; has ordered this ebb and flood of the air of our atmosphere, with the like good design; that is, to preserve the sweet freshness, and brisk temper of this fluid, so necessary to life; and keep it, by a kind of continual circulation, from deadness and stinking. We daily feel the benefits of this wonderful contrivance; but I cannot find, that the manner of it has been hitherto accounted for. And yet no subject better deserved the serious consideration of physicians: since it has been observed, that people recover speedily from wasting chronical diseases in clear open air; and that the best constitutions are very liable to sickness in moist close places.

This reasoning is liable to only one objection, that I know of, which is this: that the appearances we have mentioned, cannot be owing to the causes now assigned; since by calculation from them, the mercury must at new and full Moon subside in the barometer to a certain degree; which yet barometrical writers do not observe to happen. Ramazzini in particular expresses his surprize on this head, thinking it reasonable to suppose, that as the tides in the ocean are observed to be greater at those times, than at any other time of the Moon, on account of the influence, which this planet is thought to have on the sea; so likewise some remarkable change ought to appear in the gravity of the atmosphere. But yet, says he, nothing of this kind has happened, worth mentioning; for through the whole course of

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this year there was little or no difference in the height of the mercury at the new and full Moons, with respect to the preceding and subsequent days; nor indeed during all the times of its darkness^s.

In answer to which, it may not be amiss to enquire into the cause of the rise and fall of the quicksilver in the barometer, which does not seem to have been cleared up by writers on this subject. First then it is certain, that this heavy fluid is raised by the pressure of the incumbent air, and that the pressure of this element is in proportion to its gravity: which as it is the greater, the more air is contained in the column directly impending on the quicksilver; whatsoever increases or diminishes this quantity of air will make the quicksilver rise or fall in the tube. Hence it is, that winds occasion very considerable changes in the weather-glass; according as they rarefy or condense the air in this column. Thus between the tropics, where the trade-winds reign, which are moderate gales, constantly blowing from the same quarter for several months together, the variations of the barometer are very inconsiderable, as Dr. Halley has observed^b; whereas in northern latitudes they are considerable, and indeed more so than in southern latitudes: because storms are more common in the former, than in the latter; and at those times, which are most subject to winds, the mercury varies almost every hour: as Ramazzini has observed about the equinoxes. For about these, he says, I have observed remarkable variations, and especially at the autumnal equinox, when the quicksilver rose and fell several lines in one day; whereas in the solstices it kept the same station as in the foregoing daysⁱ. But yet, let the air be raised ever so high at the new and full Moon, it cannot possibly happen, that the mercury should constantly subside in all places at those times: because such is the known pro-

^s Ephemerid. baromet. Mutinens. ann. 1694. p. 19. p. 111.

ⁱ Lib. citat. p. 20.

^b Phil. Trans. N^o 181.

property of winds, that those, which carry off and rarefy the air in one place, crowd it in, and condense it in another.

This matter thus far explained, it will not be improper to subjoin the solution of a difficult question, which has raised great contention among philosophers : viz. whereas water is more than eight hundred times heavier than air, how does it happen, that the latter, when replete with watery vapours, depresses the mercury in the barometer ; so that its fall is an indication of rain ? Now this phænomenon seems to me to be chiefly owing to the following causes. Water is so entirely void of elasticity, that no force can compress it into a narrower compass ; and at the same time, a boiling heat divides it into such minute particles, as to make it occupy fourteen thousand times more space, than it naturally takes up *. This vapour, more than sixteen times thinner than our air, is so subtile, that it is easily retained by the particles of the air, and unites with them, much in the same manner, as the very small parts of metals, dissolved in some acid liquors, are suspended by them. For it is well known, that the more minutely bodies are divided, the more surface they acquire in respect to their bulk. Besides, the air, which we breathe, contains a vast number of particles heavier than water, I mean the exhalations from minerals, animals, and vegetables, and in a word from all the productions of the earth. But perhaps what is of greatest moment in this case, is the quality of the particles exhaled from the earth, which are chiefly sulphureous. For it has been found by experiments, that the fumes from sulphur are so contrary to elasticity, that they quite destroy it †. Now, Sir Isaac Newton has shewn, that almost all bodies contain sulphur : and the phænomena of lightning and thunder shew, that the atmosphere is full of it. Wherefore these reasons sufficiently prove, that moist air has less power to act than dry air. When

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* See Desaguliers's Course of experimental Philosophy, vol. ii. lect. x.
Hales's Statical Essays, vol. i. p. 230. and 299.

† See

these very subtle watery vapours, by their attractive and repulsive qualities, have run into one another, and formed drops ; they thereby become heavier than air, and fall to the earth in the form of rain : and then the air, freed from these vapours, acts with greater force, and raises the mercury in the barometer.

But to return ; the winds are produced by so many different causes, that a person would find himself greatly mistaken, who would attempt to account for them all upon any one principle.

Wherefore to those already explained, we may add that constant cause of the motion of the air, I mean the heat of the Sun. For as Dr. Halley ^m has demonstrated, that the trade-winds, which reign between the tropics, owe their rise to it ; so it is most certain, that it may occasion various motions of the air in every part of the terraqueous globe. Moreover, we know that there sometimes happen violent tempests in the upper regions of the air, while we enjoy a calm below ; and that the ridges of mountains check the propagation of the winds in many places : so that it is no wonder, that the phenomena of the changes of the air, which we have ascribed to the action of the Moon, are not always constant and uniform. Now the chief causes of uncertain and irregular winds are these. First, elastic vapours forced from the bowels of the earth, by subterraneous heats, and condensed by what cause soever in the atmosphere. Secondly, a mixture of effluvia of different qualities in the air, may, by rarefactions and fermentations, produce winds, and other effects, like those resulting from the combination of some chemical liquors. And that such things happen, we are assured from the nature of thunder, lightning, and meteors. Thirdly, from the eruptions of volcano's, and earthquakes in distant places, winds may be propagated to remoter countries. Lastly, the divided or united forces of the other planets, and of comets, may variously disturb the action of the Sun and Moon.

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^m Phil. Transf. N^o 183.

These things being premised, it will not be difficult to shew, that these changes in our atmosphere at high water, new and full Moon, the equinoxes, &c. must occasion some alterations in all animal bodies ; and that from the following considerations.

First, all living creatures require air of a determined gravity, to perform respiration easily, and with advantage : for it is by its weight chiefly, that this fluid insinuates itself into the lungs. Now the gravity, as we have proved, being lessened at these seasons, a smaller quantity than usual will insinuate itself ; and this must be of smaller force to comminute the blood, and forward its passage into the left ventricle of the heart : whence a slower circulation ensues, and the secretion of the nervous fluid is diminished.

Secondly, this effect will be the more sure, in that the elasticity of the atmosphere is likewise diminished. Air proper for respiration must be, not only heavy, but also elastic, to a certain degree : for as this is by its weight forced into the cavity of the thorax in inspiration, so the muscles of the thorax and abdomen press it into the most minute ramifications of the bronchia in expiration ; where the bending force being somewhat taken off, and springy bodies, when unbended, exerting their power every way, in proportion to their pressures ; the parts of the air push against all the sides of the vesiculæ, and promote the passage of the blood. Therefore the same things, which cause any alterations in this property of the air, will more or less disturb the animal motions. We have a convincing instance of all this, in those who go to the top of high mountains : for the air is there so pure (as they call it) that is, thin, and wants so much of its gravity and elasticity, that they cannot take in a sufficient quantity of it to inflate the lungs, and therefore breathe with very great difficulty.

Lastly, all the fluids in animals have in them a mixture of elastic aura, which, when set at liberty, shews its energy, and causes those intestine motions, we observe in the blood and spirits ;

spirits ; the excess of which is checked by the external ambient air, while those juices are contained in their proper vessels. Now when the pressure of the atmosphere upon the surface of our body is diminished, the inward air in the vessels must necessarily be enabled to exert its force, in proportion to the lessening of the gravity and elasticity of the outward : hereupon the juices begin to ferment, change the union and cohesion of their parts, and stretch the vessels to such a degree, as sometimes to burst the smallest of them. This is very plain in living creatures put into the receiver, exhausted by the air-pump ; which always first pant for breath, and then swell, as the air is more and more drawn out : their lungs at the same time contracting themselves, and falling so together, as to be hardly discernible, especially in the lesser animals ⁿ.

Concerning the weight of the atmosphere on a Human Body, and its difference of pressure at different times, let this estimate suffice. We will lay it down as certain, that this weight and pressure may be computed from the force, with which the air raises the quicksilver in the barometer. The surface of a man's body, of a middle size, is fifteen square feet, or 2160 inches. The weight of a cubic inch of quicksilver is 8,101, &c. ounces averdupois. Wherefore the pressure of the air on every square inch of the Human Body, in the ratio of the weight of the quicksilver in the barometer, will stand thus. A column of quicksilver, an inch square, can, in England be raised in the barometer to 30 inches and $\frac{8}{10}$, by the air when heaviest ; and it will subside to 28 inches, when the air is lightest. Consequently, the air, when heaviest, will press on every inch of the surface of the Human Body, with the weight of 15 pounds and 9 ounces ; when lightest, with that of 14 pounds 2 ounces averdupois. Thus the whole body, in the heaviest air, sustains a weight of about 23684 pounds ; in the lightest, of 30622 pounds 5 ounces. Whence the difference of pressure at different times is 3062 pounds.

ⁿ Esperienze dell' accademia del cimento, p. 118.

pounds nearly. True it is, that the internal air of the Human Body makes a resistance to that weight : but yet such change of pressure must necessarily have considerable effects ; especially when this internal air, through some defect in the animal fluids, with which it is mixed, is increased or diminished in its natural properties.

Before we proceed to other matters, it may be worth the while to take notice of two things : first, that effects, depending on such causes as these, must of necessity be most visible in weak bodies, and morbid constitutions, when other circumstances concur to their taking place ; while strong bodies and sound constitutions are little affected by them. For this reason, whatever mischiefs do hence follow, cannot in the least disparage the wise contrivance of infinite power, in ordering these tides of our atmosphere. The author of nature has certainly made all things to the greatest advantage, that could be, for the whole system of animals on our globe, although such a disposition might in some cases prove prejudicial to a few. The position and distance of the Sun are so adjusted, as to give, in the most beneficial manner possible, heat and light to the earth : yet this notwithstanding, the excessive summer heats in some countries may be attended with bad consequences ; in others, the winter colds may be so intense, that tender bodies cannot bear them ; and in all seasons and climates, changes of weather may give birth to diseases. The whole, however, we must own, is most carefully provided for. Besides, as most of these last mentioned inconveniencies are by easy shifts to be avoided ; so there are such powerful checks put to this ærial flux and reflux, so many ways of abating the damages accruing from it now and then ; that these are of no account, in comparison of the mighty benefits hence arising, in which the race of mankind does universally share.

Secondly, that the other planets have likewise their peculiar influences ; which, though inferior to those of the Sun and Moon,

Moon, yet contribute various ways towards increasing or diminishing the action of these on Human Bodies. And these united forces are of such consequence, that violent and occult diseases, with which whole nations are seized, may be certainly attributed to them. And the *Θεῶν τι* or somewhat divine of Hippocrates^o, which he recommends to have regard to in diseases, is most probably nothing more than the state of our atmosphere, occasioned by the influence of the planets, or some other uncommon and unknown natural cause; as I have more amply explained on another occasion^p.

^o Prognostic. i.

^p See Account of Poisons, essay vi.

C H A P. II.

Of the diseases, and symptoms, which derive their origin from the abovementioned causes.

INOW proceed to examine what particular functions of animal bodies are disturbed by these periodical rarefactions of the fluids in their proper vessels: and here I shall not ground my opinion on my own observation alone, but likewise take in the assistance of other medical writers. For there are no histories in physic, which we may more safely take upon the credit of the authors, who relate them, than such as we are now going to mention. In some cases a point may perhaps be strained, to serve a darling hypothesis, which the writer has taken up; but here we are much more likely to have pure matter of fact: because hitherto no one has pretended, that the appearances of this kind are within the reach of any scheme of philosophy.

And first it appears evident to me, that the Moon's influence is necessarily greater on the nervous fluid or animal spirits, than

on the blood, or any other fluid of the animal body. For as that fluid is composed of extremely minute, and (as I have shewn elsewhere ^q) elastick parts; it must be the more easily susceptible of the power of any external cause whatever. Wherefore the Moon's action will chiefly regard those diseases, which are occasioned by the vitiation of those spirits.

Of this class none seem more remarkable than epileptick diseases, which, besides the other difficulties, with which they are attended, have this also surprizing, that in some the fits do constantly return every new and full Moon. The Moon, says Galen ^r, governs the periods of epileptick cases. Upon this score, they, who were thus affected, were by the Greek writers sometimes called Σεληνιακοὶ ^s, and in the histories of the gospel Σεληνιαζόμενοι ^t, and by some of the Latins afterwards, Lunatici ^u.

And indeed, I myself remember, when I was physician to St. Thomas's hospital during the time of queen Anne's wars with France, that several of the sailors of our fleets were brought thither, and put under my care for this distemper: most of whom were new men, who had contracted the disease by frights, either in sea-engagements, or in storms. But the Moon's influence was so visible on the generality of them at the new and full, that I have often predicted the times of the fits with tolerable certainty. And T. Bartholin tells a story of an epileptick girl, who had spots in her face, which varied both in colour and magnitude, according to the time of the Moon. So great, says he, is the correspondence between our bodies and the heavens ^x.

Moreover, the learned Dr. Pitcairne has assured me, that he attended a patient of thirty years of age, of a thin habit and somewhat melancholick constitution of body; who, nine years before, after a considerable hemorrhage from the nose, com-

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^q See Introduction to a mechanical account of Poisons.

^r De diebus criticis, lib. iii. ^s Alexand. Trallian. lib. i. c. 25.

^t Matth. c. xvii. v. 15.

^u Apuleius de virtutibus herbar. cap. ix. & lxxv. ^x Histor. anatom. centur. ii. hist. 72.

plained of some humour suddenly arising from his right hand to the top of his shoulder, and then fell senseless on the ground. Upon his recovery from the fit, he felt so great a numbness in that hand, that he could not stir his fingers: and his right arm was violently tossed forward and backward, against his will, for the space of four minutes; during which time he lost the use of his tongue. And this disorder returned periodically twice every year, in March and September, that is, at the new Moon, near the vernal and autumnal equinoxes. The most remarkable particulars of this case were these. First, the paroxysm came on more frequently in the night, than in the day-time. Secondly, neither his feet, nor left arm, were ever affected by the disorder. Thirdly, the stupor, which constantly remained since the first seizure of the disorder, did never after deprive him of his senses: for he could walk or ride, even when it was at the worst. Fourthly, while the humour was moving up his hand, he could still use his fingers: but when it had got up to the arm, then were they deprived of feeling and motion: afterwards, upon its seizing the right side of the head, it occasioned violent convulsive motions of the arm for three or four minutes. Fifthly, at those times when the fit was wont to return, he was sometimes seized with the numbness twice or thrice in an hour; at other times not above once in two or three days. Sixthly, the disease was augmented by warm bathing: for after it, the paroxysms were more violent than usual. Lastly, his memory was remarkably affected about the time of the paroxysm.

The same gentleman informed me likewise, that he knew several women, who were subject to epileptick symptoms at the new and full Moon; especially pregnant women, and those who stopped childing early, and whose menstrual purgations left them before the usual time. These were frequently seized by the fit, in their sleep, and sometimes in the day-time also. And he remembered to have cured two young women, whose fits followed the change of the Moon; but they were of that kind of epileptick

leptick fits, which are commonly called St. Vitus's dance. Their gestures were very odd and incertain, and somewhat like dancing: and they were deprived of speech, during the paroxysm. In fine, other physicians had tried in vain to cure these disorders by Sydenham's method *, for want of attending to their monthly periodical returns.

But no greater consent in such cases was perhaps ever observed, than what I saw many years since in a child about five years old; in which the convulsions were so strong and frequent, that life was almost despaired of, and by evacuations and other medicines very difficultly saved. The girl, who was of a lusty full habit of body, continued well for a few days; but was at full Moon again seized with a most violent fit: after which, the disease kept its periods constant and regular with the tides. She lay always speechless during the whole time of flood, and recovered upon the ebb. The father, who lived by the Thames side, and did business upon the river, observed these returns to be so punctual; that not only coming home, he knew how the child was before he saw it, but in the night has risen to his employ; being warned by her cries, when coming out of the fit, of the turning of the water. This continued fourteen days, that is, to the next great change of the Moon; and then a dry scab on the crown of the head, (the effect of an epispastick plaister, with which I had covered the whole occiput in the beginning of the illness) broke; and from the fore, though there had been no sensible discharge this way for above a fortnight, ran a considerable quantity of limpid serum. Upon which, the fits returning no more, I took great care to promote this new evacuation by proper applications, with desired success, for some time; and when it ceased, besides three or four purges with *mercurius dulcis*, &c. directed to be taken about the new and full of the Moon, I ordered an issue in the neck, which being thought troublesome, was made in the arm. The patient how-

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ever

* In *Schedula monitoria*.

ever grew up to woman's estate, without ever after feeling any attacks of those frightful symptoms.

Whether or no it be through want of due heed and inquiry, that we have not, in all the collections of histories and cases, any instance of the like nature so particular as this is, I will not take upon me to assert: but to me it seems probable, that when due attention shall be given to these causes, various examples will occur of the same kind of sympathy. In the mean time I cannot think it strange, that some of the antients, as Aretæus has recorded ^y, attributed this disease entirely to the Moon; and were of opinion, that the deity of that planet inflicted this kind of punishment on wicked people for their crimes, and therefore called it the sacred disease.

And it may not be improper to remark in this place, that the raving fits of mad people, which keep lunar periods, are generally accompanied with epileptick symptoms: which was attested to me as a constant observation by the late learned Dr. Tyson, formerly physician to Bethlehem hospital, who upon that account usually called such patients epileptick mad.

The vertigo is nearly related to the epilepsy according to Galen ^z, and therefore it was by the antients called the little epilepsy, as Cælius Aurelianus relates ^a. This at least is certain, that both these diseases are frequently observed to obey the lunar influence: which is confirmed by several cases, that fell under the observation of Dr. Pitcairne.

Hysterical disorders do likewise partake of the same nature; and therefore a just regard to those periods will contribute to happier success in the cure. One of Pitcairne's cases is that of a young married woman, of a fat habit of body, and red-haired, who never had her monthly evacuations in a proper quantity. She had for four years past complained of a troublesome weight or pressure on the crown of the head, and of a cold humour
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^y De diuturnis morbis, lib. i. c. 4.
aph. 17.

^z In aphor. Hippoc. comment. iii.
^a De morb. chron. lib. i. cap. 2.

at the same time trickling down to her shoulders, with great giddiness and choaking : she also threw up a sharp slimy humour from off her stomach, had a pain and squeezing about her heart, with a difficulty of breathing in the morning at uprising; and these symptoms returned constantly every new and full Moon.

Carolus Piso, an accurate writer of medical observations, relates two cases to this purpose; the first of a lady of quality, whose left cheek and part of the neck were wont to swell very sensibly, about the new Moon; and this symptom was constantly attended with an hysterical suffocation^b. The second was of a girl, who, about each full Moon of the spring season, was seized with such obstinate hysterical symptoms, that they continued the whole third quarter. The first day she was convulsed, then she was seized with a loss of speech, and fell into a deep sleep, which lasted two days : and the remaining four days she spent in doing insignificant things, crying out for help, or in short in a slight delirium, without a wink of sleep^c.

Physicians have recorded several remarkable instances of periodical palsies. The same Piso gives the following. An aged man was seized with a sleepiness and great lassitude, which was followed by a dead palsy, stupor, loss of memory, and some degree of folly, with a fever. These complaints returned regularly every new Moon for two years; the symptoms gradually lessening, and the last fits had but a faint resemblance with those, he suffered in the beginning^d.

Tulpius, a very candid and judicious writer, relates a singular case of a shaking palsy, with which a maiden of a pale complexion, and phlegmatick habit of body, was afflicted during the space of three years, not constantly indeed, but with intermissions; each fit lasting near two hours, accompanied with a hoarseness and suppression of voice. The paroxysms manifestly agreed,

^b De morbis a serosa colluvie, Obs. 27.

^c Obs. 28.

^d Obs. 16.

agreed, sometimes with the Tides, sometimes with the Moon, and sometimes with the Sun : for according to the change of these, the returns were sometimes earlier, sometimes later ^c.

The antients observed, and every one knows, how great a share the Moon has in forwarding those evacuations of the weaker sex, which have their name from the constant regularity they keep in their returns. And there is no question to be made, but the correspondency, which we here observe, would be greater still, and even universal ; did not the infinite varieties in particular constitutions, climates, manner of life, and many accidents, one way or other concur to make a difference. It is very observable, that in countries nearest to the equator, where we have proved the lunar action to be strongest, these monthly secretions are in much greater quantity, than in those near the poles, where this force is weakest. This Hippocrates ^f takes notice of, with respect to places far north, and gives it as one reason, why the women in Scythia are not very fruitful.

The case being thus with females, it is no wonder, if we sometimes meet with periodical hemorrhages answering to the times of the Moon in males also. For as a greater quantity of blood, in proportion to the bulk in one sex, is the reason of its discharging itself through proper ducts, at certain intervals, when the pressure of the external air being diminished, the internal aura can exert its elasticity ; so in the other, if at any time there happens to be a superabundance of the same fluid, together with a weak tone of the fibres ; it is plain that the vessels will be most easily burst, when the resistance of the atmosphere is least. And this more especially, if any accidental hurt, or rarefying force has first given occasion to the other causes to take effect.

I have known a young gentleman of a tender frame of body, but otherwise healthy, who having once, by over-reaching, strained the parts about the breast, fell thereupon into a spitting
of

^c Observ. med. lib. i. cap. 12.

^f De aëre, aquis, & locis.

of blood; which for a year and half constantly returned every new Moon, and decreasing gradually, continued always four or five days: the fits being more or less considerable, according as his management about that time contributed to a greater or lesser fulness of the vessels.

Doctor Pitcairne's own case is remarkable, both in regard to the disease and its concomitant circumstances. In the year 1687, being at a country-seat near Edinburgh in February, on a fairer day than usual at that season, and the Sun looking reddish; he was seized, at nine in the morning, the very hour of the new Moon, with a sudden bleeding at the nose, after an uncommon faintness. And the next day, on his return to town, he found that the barometer was lower at that very hour, than either he, or his friend Dr. Gregory, who kept the journal of the weather, had ever observed it: and that another friend of his, Mr. Cockburn, professor of philosophy, had died suddenly at the same hour by an eruption of blood from the lungs; and also five or six others of his patients were seized with different hemorrhages.

We have two notable instances of the like nature in our Philosophical Transactions; the one related by Dr. Musgrave^s of a person, who, from his infancy to the twenty-fourth year of his age, had every full Moon an eruption of blood on the right side of the nail of his left thumb; at first to three or four ounces, and after his sixteenth year, to half a pound each time; which when, by searing the part with a hot iron, it stopped, he fell into a spitting of blood, and by frequent bleeding, &c. was very difficultly saved from a consumption. The other^h is a story of an inn-keeper in Ireland, who from the forty-third year of his life, to the fifty-fifth (in which it killed him) suffered a periodical evacuation at the point of the fore-finger of his right-hand; and whenever they endeavoured to stanch the blood, it raised most exquisite tortures in his arm. And although the
fits

fits here kept not their returns so certain as in the forementioned case, (it may be either from the irregular way of living of the patient, or the mighty change every effusion made in his habit of body, the quantity seldom amounting to less than four pounds at a time) yet there is this remarkable circumstance in the relation, that the first appearance of this hemorrhage was at Easter, that is, the next full Moon after the vernal equinox: which is one of the two seasons of the year, at which we have proved the attraction of the air, or diminution of its pressure, to be greater than at any other time whatsoever.

But we are besides this to consider, that the statick chair, and nice observation taught Sanctoriusⁱ, that men do increase a pound or two in their weight every month, which overplus is discharged at the month's end, by a crisis of copious, or thick turbid urine. It is not therefore at all strange, that we should once a month be liable to the returns of such distempers, as depend upon a fulness of the vessels; that these should take place at those times especially, when the ambient air is least able to repress the turgency; and that though new and full Moon are both of equal force, yet that sometimes one, and sometimes the other only should influence the periods, according as this or that happens to fall in with the inward repletion.

The fluor albus is a disease equally common and difficult of cure. Of this disease Dr. Pitcairne has observed a case, which lasted four years: wherein the returns came regularly at every new Moon, and the discharge constantly lasted eight days.

Ulcers are liable to various accidents, which render some of them of incertain prognostick: and yet even in these the afflux of humours is sometimes manifestly altered by this power. Baglivi^{*} was acquainted with a learned young man at Rome, who laboured under a fistula in the abdomen, penetrating to the colon; which discharged so plentifully in the increase, and so sparingly

ⁱ Medic. static. sect. 1. aph. 65.
pag. 449.

^{*} De experiment. circa sanguin. Operum

sparingly in the decrease of the Moon, that he could make a very true judgment of the periods and quadratures of that planet, from the different quantity of the matter that came from him. This reminds me of the case of a young man, who after impure coition first felt a pain in his back, and a weakness and listlessness to walk in his thighs for four days. After this, appeared an ulcer in the glans penis, which ran with fetid matter. This flux stopped spontaneously in about a week; but returned next new Moon, and continued so to stop and return for some months; till he was put into a proper course of medicine, whereby he was perfectly cured.

Nephritick paroxysms have frequently been observed to obey the lunar attraction. Tulpus¹ relates the case of Mr. Henry Ainsworth, an English minister at Amsterdam, who had a fit of the gravel and suppression of urine every full Moon; of which he found no relief till the Moon decreased, unless by bleeding at the arm. After his death two large stones were taken out of his bladder, and the pelvis of the left kidney was enlarged to that degree by the quantity of urine so often stopped there, as to contain almost as much as the bladder itself. He likewise saw a case of a capillorum mictus, which returned periodically every fortnight, with great difficulty of urine, and such uneasiness in the patient's body, that he could scarcely keep in bed^m.

There is a fact almost contrary to these related by T. Bartholin; who being called to a consultation on the case of M. Bullichius, the chief magistrate of Copenhagen, found that for some years past he had been afflicted with a periodical diabetes spuria, which returned every month with pain after a severe nephritick fit, at or near the full Moon; when he made twelve quarts or twenty-four pounds of water, though he had not drank a pintⁿ.

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¹ Observ. lib. ii. c. 43.
Hafniens, vol. i. Obs. 5.

^m Ibid. cap. 52.

ⁿ Acta medic. & philos.

I was present, many years since, at the dissection of a child about five years old, who died of the frequent returns of nephritick fits, attended with vomitings and a diarrhœa. The kidneys and ureters were quite stuffed with a slimy calculous matter, and it was very instructive to see the different degrees of concretion in the several parts of it, from a clear limpid water to a milky liquor, which shot into branchy crystals, and these coalescing became a hard friable substance. Dr. Groenvelt, who had attended the boy in his illness, observed him to be seized with his pains at every full Moon for several months together, which generally ended with the voiding of a small stone or two.

To these nephritick cases I shall add one more, which fell under my own notice. A young lady, fourteen years of age, of a good complexion, was from her infancy afflicted with this odd disorder. A day or two before the full Moon she waxed pale, weak, dejected and melancholy; and then unwittingly discharged a large quantity of urine in her sleep. And this discharge continued five or six nights together: after which it ceased, and then her colour and chearful temper returned. The best strengthening medicines were of no avail, until proper evacuations were thought of and made two or three days before the return of the paroxysm: which prevented the lunar influence.

That the fits of the asthma are frequently periodical, and under the influence of the Moon, and also of the weather, Van Helmont takes notice from his own experience^o. And Sir John Floyer, who has given us a more particular history of this disease than any other author, observes, that the fits usually return once in a fortnight, and frequently happen near the change of the Moon^p.

A more uncommon effect of this attractive power is related by the learned Kirckringius. He knew a young gentlewoman, whose beauty depended upon the lunar force, insomuch that at full Moon she was plump and very handsome; but in the decrease

^o Asthma & Tuss. §. 22.

^p Treatise of the asthma, p. 17.

crease of the planet so wan and ill-favoured, that she was ashamed to go abroad; till the return of the new Moon gradually gave fulness to her face, and attraction to her charms¹. If this seems strange, it is indeed no more than an influence of the same kind with that, which the Moon has always been observed to have upon shell-fish, and some other living creatures. For as the old Latin poet Lucilius says:

*Luna alit ostrea, & implet echinos, muribu' fibras
Et pecui addit ———².*

And after him Manilius:

*Si submersa fretis, concharum & carcere clausa,
Ad lunæ motum variant animalia corpus³.*

The knowledge of crises in acute diseases is attended with great difficulties: wherefore it may be very well worth the pains to inquire, what share such an alteration in the weight and pressure of the atmosphere may have in them. The antients made great account of critical days, and regulated their practice in fevers according to the expectation they had from them. This part of physick is grown now into disuse, quite slighted, and even ridiculed; and that I suppose chiefly for these two reasons. For in the first place, the earliest observations of this kind, which were drawn into rules, being made in hot eastern countries; when these came to be applied to the distempers of the colder northern regions, without allowance given for the difference of the climate, they were oftentimes found not to answer. And secondly, fevers of old were treated with few medicines, and chiefly managed by very slender diet: the motions of nature were carefully watched, and no violence offered to interrupt her work. The histories therefore of crises, though of great

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¹ Observ. anatomic. 92.
nomic. lib. ii. ver. 93.

² Apud A. Gellium, lib. xx. c. 8.

³ Astro-

use and certainty under such management as this, were at length unavoidably set aside and lost; when acute cases came to be cured, according to this or that hypothesis, not only by evacuations, but hot or cold alteratives too: there being no longer any room for those laws of practice, which supposed a regular and uniform progress of the distemper.

Wherefore, in order to understand a little, both what might induce the first masters of our profession to so nice and strict an observance in this point; and what grounds there may be now, for a more due regard to their precepts, even upon the score of the lunar attraction only; I propose a few remarks, after having premised some things proper to be known on this subject.

It is most certain, that epidemick fevers are caused by some noxious qualities of our atmosphere; and therefore it seems reasonable to suppose, that such changes as produce those effects may happen in it in all seasons by the influence of the Moon. And this is confirmed by Ramazzini in his treatise of the epidemick constitution of the years 1692, 1693, and 1694, in the city and neighbourhood of Modena. During these three years a very contagious purple fever reigned. "And it was worthy of observation, says he, that the disease raged more violently after the full Moon, and especially in the dark quarter; and abated upon the appearance of the new Moon: as not only I, but other physicians here, constantly observed; and this observation was of great service both in the prognostick and cure¹."

It is well known, that in solar eclipses the Moon is in conjunction with the Sun, and in opposition in lunar eclipses: wherefore there is nothing strange in what this same author wonders at in these words. "What happened January 21, 1693, was very surprizing. For the Moon having been eclipsed that night, the greatest part of the sick died about the very hour of the eclipse: and some were even struck with sudden death²."

And

¹ De constit. ann. 1692-3-4. Mutin. 1695. 4to, pag. 97.

² Ibid. pag. 98.

And the learned Ballonius relates a fact of the same nature, where he says, that some physicians having met on the case of a lady of quality ; while they were actually in consultation, a solar eclipse was at hand. Wherefore, as they thought the patient in no imminent danger, they went out to view the eclipse : but they were soon called back, upon the lady's fainting away, the very instant it began. And she did not recover her senses, till the eclipse was quite over ^w.

If physicians had formerly been acquainted with what I have laid down on the Moon's influence, I make no doubt but a much greater number of facts of this kind would occur in the histories of epidemick diseases, than we find recorded at present. To those already mentioned let me add one more, which is the more interesting, upon account of the subject of it. It was our great genius and excellent philosopher the lord high chancellor Bacon, viscount St. Albans ; who had this peculiarity in his constitution, that at every lunar eclipse he suddenly fell into a swoon ; though he did not so much as think or even know of the eclipse ; and did not recover, till it was ended ^{*}.

And it is still fresh in the memories of some, that in that memorable eclipse of the Sun, which happened April 22, 1715, and in which the total obscuration lasted here at London three minutes and twenty-three seconds, many sick people found themselves considerably worse during the time : which circumstance people generally wondered at, but I could easily account for. In the morning I went with Dr. Halley, and other astronomers, to the observatory on the top of the Royal Society's house in Crane-Court, in order to view the eclipse, and consider the state of the weather, and changes that might probably happen in our atmosphere ; and then the Sun was very bright, and the sky remarkably serene. But when the eclipse became total, the air was so uncommonly cold and moist, that it made us shiver ; and the face.

^w Epidem. lib. i. pag. 48.
Francis Bacon, Lord Verulam, &c.

^{*} See Rawley's life of the right honourable

face of nature appeared so extremely gloomy and dismal, that the birds fluttered about in wild affright, and the cattle in the fields stood fixed as statues, through excess of astonishment. Whereas, no sooner had the Sun begun to emerge, but every creature assumed so chearful an aspect; that I never saw, nor indeed do I ever expect to see so pleasing a sight.

But to return to the subject of fevers; it is evident that those changes of the air, which affect healthy bodies, must have a considerable effect on weak constitutions, and those labouring under acute diseases. To what has been already said on this head I shall here add, that the plague itself is liable to be affected by the Moon's action. For Diemerbroeck, who has given an accurate description of the plague at Nimeguen in the year 1636, observed, that the contagion constantly increased about the new and full of the Moon; and that the greatest part of those, who were then seized, died¹. Much more may be said on this subject; but it appears too plain, to need further illustration: wherefore I return to the subject of crises.

First, all epidemick diseases do in their regular course require a stated time, in which they come to their height, decline, and leave the body free. This is so constant and certain, that when a fever of any constitution, which is continual in one subject, happens, from some other cause, in another to be intermitting; the paroxysms do always return so often, as all together to make up just as many days of illness, as he suffers, whose distemper goes on from beginning to end, without any abatement. Dr. Sydenham, a sworn enemy to all theories, learned thus much from downright observation; and gives this reason, why autumnal quartans hold six months: because by computation the fits of so long a time amount to 336 hours, or 14 days, the period of a continual fever of the same season². So Galen takes notice, that an exquisite tertian is terminated in seven paroxysms; because

¹ De peste, pag. 9.

² Method. curandi febres. Lond. 1666, 8vo, pag. 100.

because a true continual has its crisis in seven days : that is, the fever lasts as long in one, as in the other ; in as much (says he) as a fit in an intermitting fever answers to a day in a continual ^a. Now this so comes to pass, because,

Secondly, in these cases there is always a fermentation in the blood, which goes not off, till the active particles are thrown out by those organs of secretion, which, according to the laws of motion, are most fitted to separate them.

Thirdly, as different liquors, put upon a ferment, are depurated in different times ; so the arterial fluid takes up a determined period, in which it is discharged of an induced effervescence.

Fourthly, the symptoms, during this ebullition, do not proceed all along in the same tenour ; but, on some days particularly, they give such evident marks of their good or bad quality, that the nature of the ensuing solution may very well be guessed at, and foretold by them. Things being thus, those days, on which the disease was so evidently terminated one way or other, were by the antients called the days of crisis ; and those, upon which the tendency of the illness was discovered by most visible tokens, the indices of the critical days.

And thus far the foundation was good : but when a false theory happened unluckily to be joined to true observations, this did considerably puzzle the affair. Hippocrates, it is plain, knew not to what to ascribe that remarkable regularity, with which he saw, that the periods of fevers were generally ended on the seventh, fourteenth, or one and twentieth day. The philosophy of Pythagoras was in those ages very famous, of which harmony and the mysteries of numbers made a considerable part ; odd were accounted more powerful than even, and seven the most perfect of all. Our great physician espoused these notions, and confined the stages of acute distempers to a septenary progression :

^a Comment. in aphor. Hipp. lib. iv. aph. 59. & de crisib. lib. ii. c. 6.

gression^b: upon which this inconvenience followed, that when a crisis fell out on an even day, his measures were quite broken, and he apprehended a relapse^c; and if the fever did not terminate on the seventh, he waited for the fourteenth, and even for the twenty-first day.

But whereas the crisis of fevers were sometimes observed to fall on the sixth or eighth day of the disease, without any return; Asclepiades rejected this whole doctrine as vain^d: and Celsus, finding it to be too nice and scrupulous, observes, that the Pythagorean numbers led the ancients into the error^e.

Galen, being aware of this, succeeded much better in his reasoning upon the matter: and very happily imputed the critical changes, not to the power of numbers, but to the influence of the Moon; which, he observes, has a mighty action upon our earth, extending the influence, not in energy, but in nearness^f. So that, according to him, the septenary periods in acute diseases are owing to the quarterly lunar phases, which are the times of the greatest force, and which return in about seven days^g. Hence it appears, that Galen hit upon the cause of the changes in the returns and periods of fevers; but did not so much as guess at the manner of its producing the effect.

The result of the whole affair in short is this. A crisis is no more than the expulsion of the morbid matter out of the body, through some or other of the secretory organs; in order to which, it is necessary that this should be prepared and comminuted to such a degree, as is required to make it pass into the orifices of the respective glands. And therefore, as the most perfect crisis is by sweat, (both by reason that the subcutaneous glands do naturally discharge more than all the others put together; and also that their ducts being the smallest of any, whatsoever comes this way is certainly very well divided and broken) so the most imperfect is a hemorrhage: because this is an argu-
ment,

^b De septimestri partu.
c. 4.

^c Ibid.

^d Aphor. sect. iv. 36.

^e De diebus decretor. lib. iii.

^f Vid. Celsum, lib. iii.

^g Ibid.

ment, that what offends is not fit to be cast off in any part, and consequently breaks the vessels by the effervescence of the blood. An abscess in those organs, which separate thick slimy juices, is of a middle nature betwixt these two.

Now it is very plain, that if the time, in which either the peccant humour is prepared for secretion, or the fermentation of the blood is come to its height, falls in with those changes in the atmosphere, which diminish its pressure at the new and full Moon; the crisis will then be more compleat and large: and also, that this work may be forwarded or delayed a day, upon the account of such an alteration in the air; the distension of the vessels, upon which it depends, being hereby made more easy, and a weak habit of body in some cases standing in need of this outward assistance. Thus a fever, which requires about a week to its period, may sometimes have a good crisis on the sixth, and sometimes not till the eighth day, as Hippocrates has observed.

In order therefore to make true observations of this kind, the time of invasion is to be considered; the genuine course of the distemper must next be watched, which is not to be interrupted by any violent methods; the strength of nature in the patient is to be attended to, and by what secretions the crisis is most likely to be performed: and it will then be found, that not only the new and full Moons, but even the southings, whether visible or latent, of the planet, are here of considerable moment.

To conclude, this powerful action of the Moon is observed not only by philosophers and natural historians, but even by the common people, who have been fully persuaded of it time out of mind. Pliny relates, that Aristotle laid it down as an aphorism: that no animal dies but in the ebb of the tide^h. And that births and deaths chiefly happen about the new and full Moon, is an axiom even among women. The husbandmen likewise are regulated by the Moon in planting and managing
C c trees,

^h Hist. nat. lib. ii. cap. 98.

trees, and several other of their occupations. So great is the empire of the Moon over the terraqueous globe.

C H A P. III.

Of the benefits accruing to the practice of physick from this theory.

IT is now time to inquire, what use may be made of these observations in practice. And first, they must be of service in predicting the returns of the paroxysms, and the issue of the disease; which will gain reputation to the physician, and give confidence to the patient. But I will endeavour to shew, that they will be of greater service still, in contributing towards the cure of diseases. In order to which, I will first lay down some general remarks, and then descend to particulars.

It seems pretty evident, that all diseases, whose returns answer to the changes of the Moon, arise from repletion. For as the Moon's action produces its effect by distending the vessels only; it is manifest, that plenitude alone can increase this distension, whether it happen by the quantity of the fluids, or their effervescence. And therefore all diseases, which return but once or twice in a month, and are increased by the Moon's influence, require evacuations: which must diminish at least, if not cure the disease. But as regard is to be had to the nature of the distemper, and the time and manner of the evacuation; it is necessary to establish some rules on each of these heads.

First then, we are to consider, whether the disease lies in the blood-vessels, or in the vicious quality of the fluids separated from the blood, and conveyed to some principal part of the body. In the first case we should lay the greatest stress on phlebotomy; in the second, on proper medicines for correcting the

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taint of the fluids. Besides, as we know by experience, that evacuations are to be made by the way, which nature points out; great attention must be given to finding out that way in every particular disease. Then the best time for evacuating is in most cases a little before the paroxysm or exacerbation: not only because its violence is thereby obviated, but likewise because the humours then turgid will flow out of the body with more ease, and in greater plenty. And in order to make this matter better understood, I will add some few practical remarks on the diseases mentioned in the foregoing chapter.

The epilepsy is extremely difficult to be cured in adults, but in children it is the reverse. And that evacuations, especially by a blister laid to the back part of the head, are of great use here, is plain from a case above relatedⁱ; which not only confirms the assertion of Panarolus, who says, that he cured a boy of seven years of age, who had been speechless, stupid, and epileptick, by a blister applied to the coronal future^k; but proves the goodness of Celsus's advice, to apply cupping glasses with scarification to the occiput; and besides to apply the actual cautery in two places, one in the occiput, and the other lower down in the neck upon the first vertebra; in order to have a plentiful drain of the noxious humour^l. For the head is the chief seat of diseases of this kind: frequently occasioned in children by plenitude, and the lentor of the blood, which has not been comminuted by bodily exercise, or the action of the lungs; and in adults by a redundancy of humours, falls, or sudden frights. In this obstinate disease the most proper medicines for correcting the juices, seem to be native cinnabar, and more especially wild valerian root, before it has shot out its stalk; pulverized, and given frequently in a due quantity. For my part, I have several times found them both very successful; and for the virtues of the last, I particularly recommend the reader to

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ⁱ Pag. 179.^k Obs. med. pentecost. iv. Obs. 30.^l Lib. iii. cap. 23.

Panarolus^m, and the famous botanist Fabius Columnaⁿ. However it must not be forgot, that this disease owes its origin to so many different causes, and is bred in so many different constitutions of body; that the same remedy, which succeeds in one case, often fails in another: and therefore different medicines are to be tried, especially on adults. And great regard must be had to the times, in which the paroxysms most usually return, in order to effect a cure.

The vertigo is likewise cured by these same medicines. But the patient must be vomited now and then, and blistered on the head or neck. This is a disease of the eyes, and generally arises from too great tension of the extremities of the small arteries, as Bellini has demonstrated: wherefore it is no wonder, if it should follow the changes of the Moon.

Hysterical disorders are cured much in the same manner. But they seldom require bleeding, and purging should be used with caution. Emeticks are of greater service, especially a little before the fit. For in the fit the best medicines are those, which repair the loss of spirits, as gum ammoniack, Russian castor, salt of amber, in pills, and the like. And in most of those cases, care must be taken to adapt the medicines to the usual way of living of the patient, and to the affections of her mind.

The monthly returns of paralytick disorders, which are sometimes observed, are owing to the source of the disease, which is generally the head: in which the serosities of the brain being extravasated, attack the origin of those nerves, where they happen to lodge, and cause a palsy of this or that part. Hence it is, that this disease is very often the consequence of an apoplexy, under the shape of a general palsy, or that of one side only. But when this disorder is occasioned by an external injury done to the nerves, or by internal tumours, then it observes no regular periods. The cure is to be begun by evacuating the redundant phlegm, which in most cases is best done by stool; and then

^m Obs. med. pen. 1. Obs. 33.

ⁿ Phytobas. p. 120.

then an eye must be had to the return of the distemper, not only by putting the patient into a course of attenuating medicines, as the horse-radish root, wild valerian root, mustard seed, and such like; but also of cold bathing, if his age and strength will allow it: for this remedy is not so beneficial for old folks, as for young; but as it braces up the relaxed fibres, and promotes urine, it is proper for this disease in both these respects. For this reason the antients, according to Cælius Aurelianus^o, ordered their paralytick patients to swim in the sea, or to undergo the cataractical course, by the fall of water from on high on the weak parts; on account of the greater weight of salt than fresh water, and the more intense cold of falling than still water.

St. Vitus's dance is generally called a convulsive disorder; but I look on it to be rather paralytick, and to take its rise from a relaxation of the muscles, which being unable to perform their functions in moving the limbs, shake them irregularly by jerks. And it is for the most part but a slight evil, and commonly seizes weak habits of body; girls more frequently than boys, and seldom adults. Wherefore I never found it difficult to be cured by the cold bath and chalybeate medicines.

The disorders of the monthly evacuations of the fair sex require our serious consideration. As the excess of them generally proceeds from an acrimony in the blood, so the defect is chiefly owing to a lentor. For this flux is seldom suppressed for want of a sufficient quantity of blood: such wonderful art has the all-wise author of nature employed in making full provision for an evacuation, equally requisite for the health of the individual, and the propagation of human kind. Wherefore, as in immoderate discharges regard should be had to the times, when the effervescent humour can the more easily burst through its vessels, according to the doctrine already laid down; in order

^o De morb. chronic. lib. ii. cap. i.

der to make a revulsion at those times, by drawing blood from parts the most distant from the seat of the distemper: so when a suppression of the menses requires blood-letting, Vander Linden's caution is to be observed, which is recommended by Et-muller^p, and rationally accounted for by Dr. Freind^q. Moreover, as the Peruvian bark is very powerful in allaying the effervescence of the blood, whereby the vessels are distended; it will be very proper to give it plentifully some few days before the time, that too great a discharge is apprehended.

The same method is to be observed in all periodical hemorrhages, giving those medicines at the same time, which re-strict and brace up the fibres: of which the best are burnt alum, with a fourth part of sanguis draconis, as I have found by repeated trials.

And it is worthy of remark, that so great is the Moon's influence in cases of this nature, that upon the suppression of these evacuations from one part, the blood forces its way through some other part: which was the case of the young gentleman mentioned above^r. For when his spitting of blood was stopped by the medicines just now recited, he was at the same stated times seized with a bleeding at the nose, which gave me no apprehensions, as the principal organ was no longer affected.

And this action of the Moon extends even to those quadrupeds, that are menstruated; for it has been observed, that they generally have those evacuations about the new Moon: in particular mares and monkeys, and that so constantly, that, according to the testimony of Horus Apollo, the Egyptians painted the Cynocephalus to represent the Moon, upon account of a certain sympathy, whereby the female of this animal has evacuations of blood from the uterus at the new and full Moon: and they kept monkeys in their temples, in order to point out the times of the conjunction of the Sun and Moon^s. Wherefore the Moon's influence

^p Tom. iii. pag. 442. edit. 1736.

^q Emmenalog. pag. 103.

^r Pag. 182.

^s Hieroglyphic. vid. Gesner. de Simiis.

fluence is apparent in all animals ; provided irregularities in their way of living do not prevent it.

And this theory accounts for the periodical returns of the fluor albus, which are sometimes observed, especially if the discharge be from the uterine vessels : for it issues sometimes from these, and sometimes from the glands of the vagina. In the first case, it stops upon the menstrual purgations ; in the latter, it flows with them, and continues even in pregnant women.

Running ulcers are likewise comprehended in this doctrine, it being no way surprising, that the forementioned causes should increase the discharge of pus, especially in those parts, where the lax pliant texture of the body makes little or no resistance to the distension of the vessels. Hence in ulcers of the head it has been found, that the patients are in great danger at the new and full Moon.

The best method of treating nephritick pains, is to begin by blood-letting. And it will be of service to the patient, to observe, when the paroxysms are wont to return, and to empty the vessels, at the time which threatens the greatest danger. For it is well known, that this disease is partly occasioned by the compression of the small ducts of the kidneys from the fulness of the capillary arteries ; which fulness is increased by the new and full Moon. Whence I have more than once wondered, that the chief bent of the writers on this disease is, to drive down the gravel into the ureters and bladder : whereas the dissection of dead bodies has taught me, as I have mentioned before, that the first rudiments of a calculus are a very limpid serum in the caruncles of the kidneys ; and that this may harden to the consistence of stone, will not seem strange to those, who are acquainted with the attractive force of salts in solution, and with the effects of obstructions in the capillary vessels. And hence it is, that calomel given now and then is of greater service in the beginning of this disease, than any diureticks : because this medicine removes the obstructions of the minute vessels, and
thus

thus prevents the cohesion of saline particles, which is frequently the consequence of such obstruction. Moreover, daily experience shews, that too free an use of diureticks is prejudicial in diseases of the kidneys. Which observation has not been sufficiently attended to by some physicians, who not only patronized a certain monstrous jumble of a medicine, till the legislature was wrought on to purchase the secret at an immense price; but still go on to drench their patients with it, and thereby injure the stomach, kidneys, and bladder.

Asthmatick disorders are likewise heightened by the lunar action, both on account of a lesser quantity of air taken into the lungs in each inspiration, and of the distension of the vessels by the rarefied blood: wherefore the returns of the fits are to be observed, and guarded against by moderate evacuations, as blood-letting, gentle vomits, laxatives, and sometimes catharticks. But every thing that heats the blood, should be carefully avoided, especially about the usual times of the paroxysms: because there is generally then a lurking fever; which ought not to be exasperated by heating food or medicines. Upon this score Hippocrates advises persons labouring under difficult breathing, to abstain from clamours and anger[†]. And Van Helmont observed, that asthmatick paroxysms return more frequently in summer than winter[‡]. For which reason, the proper medicines in this disease, besides those above mentioned, are such as are cooling, and at the same time promote urine; as vinegar of squils; spirit of nitre; gas sulphuris, which is water saturated with the fumes of sulphur; and several others of the same nature, enumerated by Sir John Floyer.

To what has been said above on crises in acute diseases, it may be worth while to add this one remark. Although great care should be taken, not to raise any commotion in the humours on the coming on of a crisis; yet there are cases, in which there is a necessity of making some evacuations: as for example, if
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[†] Epidem. lib. vi. sect. 4.

[‡] De asthm. & tussi.

the fever runs very high, the humours are so agitated, that no secretions can be performed. In this circumstance phlebotomy is so far from obstructing, that it promotes the crisis: in the same manner, as in the small-pox and measles, before any appearance of the pustules, when the turgescence of the humours is excessive, taking away some blood facilitates and hastens the eruption.

The case is much the same with critical abscesses, wherein the fulness and feverish heat are sometimes so great, that they require moderate evacuations, either by bleeding, or purging. For it is to be observed, that the reason, why the antients condemned purging in fevers, was, that the most of their catharticks were very violent; as sammony, black hellebore, juice of spurge, and others of the like acrid nature: upon which account they contented themselves with emptying the intestines by clysters. But as we have always a good stock of gentle catharticks, we may safely give them at any time of the disease, without the least apprehension of heating the body; especially if nature points out this way, as she frequently does.

C O R O L L A R Y.

Wherein the preceding reasoning is confirmed by observations of the effects of storms on the human body.

AS we have endeavoured to prove in the beginning of this treatise, that the celestial motions, which occasion certain distempers, and their periods or returns at stated times, are likewise able to raise winds; and that we feel the different effects of these, according as other causes concur to put the air into

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violent agitations: it may not be amiss to give some few instances, how much this reasoning is confirmed by facts.

On the twenty-sixth of November, 1703, there arose a most furious storm of wind a little before midnight, which lasted upwards of six hours. The history and whole theory of this wonderful phenomenon I shall not attempt to compile. This province was by the Royal Society conferred on the learned Dr. Halley, who was every way equal to the task. Wherefore I shall only touch on some circumstances of it, which more immediately relate to the present theme.

The Moon was then in her perigeum, and near the change: and it has been proved above, that both these circumstances contribute towards attracting the air upwards, and raising winds^w. Accordingly, the barometer was lower than usual^x, and the subsequent tides were very high. And most probably there was a concurrence of one or more of the other causes already assigned^y, though it might be difficult to come at the knowledge of them: but as the state of the weather in the preceding seasons of the year is of easier, and perhaps not less useful, consideration; I shall remark, that in those places particularly, which felt the rage of the storm, the summer and part of autumn were remarkably wet; and the winter was ushered in by open warm weather; so that a thermometer, (whose freezing point was about eighty-four) was very seldom below a hundred to the latter end of November^z. Hence we may form a probable conjecture, that the atmosphere was blended with vast quantities of saline and sulphureous exhalations; which, by their various combinations and agitations, at length gave that destructive force to the motion of the air. And this conjecture is confirmed by the flashes or coruscations, which were observed during the storm; and by the saline particles found the next day on the leaves of vegetables, even

^w Pag. 166, 167.
transf. N^o 289.

^x Phil. transf. N^o 289.

^y Pag. 172.

^z Phil.

even at many miles distance from the sea : where the grafs in some places tasted so salt, that the cattle did not care to eat it.

Instead of prosecuting this subject farther, I think it may not be amiss to subjoin this remark ; that as the new or full Moon is capable of causing those alterations in the Human Body, which we have already mentioned, even when it is not seconded by any other cause ; so if it be accompanied with a tempestuous state of the weather, the effects will be the more sensibly felt. And indeed I myself remember, that several persons complained particularly of head-achs the very night of the storm. But the case of a lady of quality of my acquaintance is very remarkable, who was struck blind in an instant that same night. Her blindness was the *ἀμαύρωσις* of the Greeks, or the gutta serena of the modern physicians : and as this is a distemper, which does not seem to me to be sufficiently understood, I will offer my thoughts on it in few words.

The cause of it is generally an obstruction and subsequent distension of the capillary arteries of the retina, or some injury done to the optick nerves. In the first kind, which is vastly the more common, the sight is darkened gradually ; in the last, the sight is lost, sometimes sooner, sometimes later, according to the cause, and sometimes insensibly in an instant. For the optick nerves are injured many ways, and rendered incapable of performing their office : as by a blow, fall, fracture or depressure of the skull they are often compressed ; in convulsions they are sometimes loaded with extravasated humours : and not uncommonly they are seized with a sudden palsy. And in the dissection of persons, who had been long afflicted with epilepsies, I have observed, that the optick nerves were pressed on by an extravasated lymph collected just over the place, where after their junction they separate, to run to the eyes : and in paralytick disorders I have found the fibres in that place wasted and dry.

I could produce a number of observations from medical writers in confirmation of this theory : but I believe the following few

may suffice. Felix Platerus, a physician of great experience, observed, in the dissection of a dead body, a tumor, resembling a gland, lying on the optick nerves, and obstructing the passage of the animal spirits to the eye^a. Guernerus Rolfincius found both the optick nerves wasted, in the body of a woman, which he opened^b. Johannes Scultetus^c saw the optick nerves wasted to half their usual size, in the body of a woman, who had had a gutta serena for twenty years. And the Ephemerides naturæ curiosorum contain the unfortunate case of a young girl, who, from a blow on the left part of the head, was seized with a fever and delirium, then lost her sight, and died soon after. Upon opening the head, a great quantity of limpid serum was found in the ventricles of the brain, especially forwards, where it entirely compressed the optick nerves^d.

Now as to the case of the lady struck blind during the storm, I think it no difficult task to account for that misfortune upon the foregoing principles, by saying, that the Moon's action, vastly increased by the concurrence of the storm, was capable of obstructing the passage of the animal spirits to the optick nerves in a tender constitution, as effectually as if these nerves had been cut through; and consequently of giving rise to the gutta serena.

Concerning the use of this theory, I can safely say, that it has pointed out to me the true method of treating this distemper, which before my time was generally esteemed incurable: and as the true knowledge of the causes of diseases is a sure foundation for practice, so I have succeeded in a number of trials on cases of this kind. Wherefore when the capillary arteries are the seat of the disease, the proper medicines are those, which most effectually attenuate the viscid humours, and remove the obstruction: and such are the chemical preparations of mercury. And these are to be continued a good while, and frequently even

^a Observat. lib. i.
chirurg. Obs. 36.

^b Dissert. anat. lib. iv. cap. 31.
^d Vid. miscell. curios. anni 1686.

^c Armament.

even to raising a salivation, which is to be kept up twenty or thirty days.

But when the disease proceeds from a defect in the nerves, it requires a different method of cure from the preceding one; and is to be varied according to the injury, which the nerves have received. But it plainly appears from what has been said, that this species of the gutta serena is generally incurable. For who, but the Almighty Maker, can pretend to restore to the optick nerves their natural tenour, either when obstructed, or their cavities streightened by a viscid sluggish humour, or when wasted and shrivelled up; or to make a free passage for, and give a due impulse to the animal spirits, when those nerves are become paralytick? But if any hopes remain, while the disease is yet recent, a caustick is to be applied to the crown of the head, over the meeting of the coronal and sagittal futures; and then the periosteum is to be laid open, to make an outlet for the noxious humour from the brain. And this ulcer, like common issues, must be kept open with peas, and continued a long time: in the mean while the patient is to be put into a course of nervous cephalicks, as wild valerian root, Russian castor, gum ammoniack, asa foetida, volatile spirits and salts of the animal tribe, &c.

But to return to storms: there happened a most violent one in England, on the third day of September, 1658, the day of the death of Oliver Cromwell. As we have no journals of the weather for that year, that ever came to my knowledge, I can say nothing of the preceding state of the air. But this is remarkable, that the storm happened near the autumnal equinox, and about the full Moon: which concurrence of causes is very well adapted to stir up great commotions in the atmosphere. However that be, it is to be observed, that the disease of that great man was of that kind, which we have shewn to be particularly under the Moon's influence. For it is upon record, that he died of a fever accompanied with grief, from the unhappy

happy state of his domestick affairs: and it is very certain, that grief disposes the animal spirits to be easily affected by causes of this nature.

But to come to a conclusion of this little work; it has been observed of those countries, which are subject to inundations, that these calamities generally happen at the times, when the Moon's action is most powerful: so that the learned Baccius^e seems to have reason for his conjecture, that the chief cause of these evils is to be sought for in excessive high tides, with the unhappy concurrence of the attractive faculty of this or that planet.

Such are the natural causes of storms and hurricanes: but as to the question of the divine power, whether or no the wrath of the Almighty sends these calamities on mankind, contrary to the ordinary course of nature, I will not take upon me to determine, who have no intention to disengage men's minds from the bands of religion. For though I am thoroughly convinced, that each part of the universe is constituted and moved by certain laws; and that the same disposition of the fabrick, which is the most convenient for the whole, sometimes brings inconveniencies and even destruction in some particular places: yet it is highly equitable, that the Omnipotent Creator should be allowed to have an absolute dominion over all his works. And possibly it was agreeable to the divine wisdom to create the world in such a manner, that natural causes should now and then produce evils and inconveniencies on mankind; whom it was necessary to affright with storms, thunder, and other extraordinary phænomena, in order to keep them in a continual sense of their duty.

^e Del Tevere, lib. iii. p. 228.

A

D I S C O U R S E

ON THE

P L A G U E.

To the RIGHT HONOURABLE
JAMES CRAIGGS, Esq;

ONE OF

His Majesty's Principal Secretaries of State.

S I R,

I MOST humbly offer to you my thoughts concerning the prevention of the Plague, which I have put together by your Command. As soon as you were pleased to signify to me, in his Majesty's absence, that their excellencies the Lords Justices thought it necessary for the publick safety, upon the account of the sickness now in France, that proper directions should be drawn up to defend ourselves from such a calamity; I most readily undertook the task, though upon short warn-
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DEDICATION.

ing, and with little leifure : I have therefore rather put down the principal heads of caution, than a fet of directions in form.

The first, which relate to the performing quarantaines, &c. you, who are perfectly versed in the history of Europe, will see are agreeable to what is practised in other countries, with some new regulations. The next, concerning the suppressing infection here, are very different from the methods taken in former times among us, and from what they commonly do abroad : but, I persuade myself, will be found agreeable to reason.

I most heartily wish, that the wise measures, the government has already taken, and will continue to take, with regard to the former of these, may make the rules about the latter unnecessary. However, it is fit, we should be always provided with proper means of defence against so terrible an enemy.

DEDICATION.

May this short essay be received as one instance, among many others, of the care, you always shew for your country ; and as a testimony of the great esteem and respect, with which I have the honour to be,

S I R,

Your most obedient, and

Most humble Servant,

Nov. 25,
1720.

R. MEAD.

P R E F A C E.

THIS book having at first been written only as a plan of directions for preserving our country from the Plague^a was then very short and concise. An act of parliament being immediately after made for performing quarantaines, &c. according to the rules here laid down, it passed through seven editions in one year without any alterations. I then thought proper to make some additions to it, in order to shew the reasonableness of the methods prescribed, by giving a more full description of this disease, and collecting some examples of the good success which had attended such measures, when they had been put in practice. At the same time I annexed a short chapter relating to the cure of the Plague; being induced thereto by considering how widely most authors have erred in prescribing a heap of useless and very often hurtful medicines, which they recommend under the specious titles of antidotes, specificks, and alexipharmacks: hoping that the great resemblance, which I had observed between this disease and the small-pox, would justify my writing upon a distemper which I have never seen.

Indeed

^a See the dedication.

Indeed the small-pox is a true Plague, though of a particular kind, bred, as I have shewn all pestilences are, in the same hot Egyptian climate, and brought into Asia and Europe by the way of commerce; but most remarkably by the war with the Saracens, called the holy war, at the latter end of the eleventh and the beginning of the twelfth century^b. Ever since which time the morbifick seeds of it have been preserved in the infected cloaths and the furniture of houses: and have broken out more or less in all countries, according as the hot and moist temperature of the air has favoured their spreading and the exertion of their force. The measles is likewise a Plague sui generis, and owes its origin to the same country.

I have now revised my little work once more: and though I cannot find any reason to change my mind as to any material points which regard either the preventing or the stopping the progress of infection; yet I have here and there added some new strokes of reasoning, and, as the painters say, retouched the ornaments, and heightened the colouring of the piece.

The substance of the long preface to the last edition is as follows.

I have insisted more at large upon the infection of this disease, than I could ever have thought needful at this time, after Europe has had experience of the distemper for so many ages; had I not been surprized by the late attempts of some physicians in France to
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^b Vid. Huet. De rebus ad eum pertinentibus, pag. 23.

prove the contrary, even while they have the most undeniable arguments against them before their eyes. In particular, I cannot but very much admire to see Dr. Chicoyneau, and the other physicians, who first gave us observations on the Plague, when at Marseilles, relate in the Reflections, they afterwards published upon those observations, the case of a man, who was seized with the Plague, upon his burying a young woman dead of it, when no one else dared to approach the body; and yet to see them ascribe his disease, not to his being infected by the woman, but solely to his grief for the loss of her, to whom he had made love, and to a Diarrhœa, which had been some time upon him^c. No question but these concurred to make his disease the more violent; and perhaps even exposed him to contract the infection: but why should it be supposed, that he was not infected, I cannot imagine, when there was so plain an appearance of it. I am as much at a loss to find any colour of reason for their denying infection in another case, they relate, of a young lady seized with the Plague, upon the sudden sight of a pestilential tumor, just broke out upon her maid; not allowing any thing but the lady's surprize to be the cause of her illness^d.

The truth is, these physicians had engaged themselves in an hypothesis, that the Plague was bred at Marseilles by a long use of bad aliment, and grew so
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^c Observations sur la Peste de Marseille, p. 38, 39, 40.
p. 113.

^d Ibid.

fond of their opinion, as not to be moved by the most convincing evidence. And thus it mostly happens, when we indulge conjectures instead of pursuing the true course for making discoveries in nature.

I know they imagine this their sentiment to be abundantly confirmed from some experiments made by Dr. Deidier^e upon the bile taken from persons dead of the Plague: which having been either poured into a wound made on purpose in different dogs, or injected into their veins, never failed, in many trials, to produce in them all the symptoms of the pestilence, even the external ones of bubo's and carbuncles. One dog, upon which the experiment succeeded, had been known, for three months before, to devour greedily the corrupted flesh of infected persons, and pledgets taken off from pestilential ulcers, without receiving any injury. From hence they conclude^f that this disease is not communicated by contagion, but originally bred in the body by the corruption of the bile. This corruption, they say, is the effect of unwholesome food; and the bile thus corrupted produces a thickness and a degree of coagulation in the blood, which is the cause of the Plague: though this they allow to be enforced by a bad season of the year, and the terrors of mind and despair of the inhabitants.

These experiments are indeed curious, but fall very short of what they are brought to prove. The most
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^e Philof. Transactions, N^o 370.
1722, pag. 279.

^f Le Journal des Sçavans,

that can be gathered from them is this : that dogs do not, at least not so readily, receive pestilential infection from men, as men do from one another : and also, that the bile is so highly corrupted in a body infected with the Plague, that by putting it into the blood of a dog it will immediately breed the same disease.

But it does not follow from hence, that the bile is the seat of the disease, or that other humours of the body are not corrupted as well as this. I make no question but the whole mass of blood is, in this case, in a state of putrefaction ; and consequently that all the liquors derived from it partake of the taint.

Accordingly it appeared afterwards from some experiments made by Dr. Couzier ^s, that not only the blood, but even the urine from an infected person, infused into the crural vein of a dog communicated the Plague. I will venture to affirm, that if, instead of bile, blood, or urine, the matter of the ulcers had been put into a wound made in the dog ; it would have had at least an equally pernicious effect : as may well be concluded from the inoculation of the small-pox.

As to the dog's eating the corrupted flesh and purulent matter of the patients ; it ought to have been considered that there are some poisons very powerful when mixed immediately with the blood, which will not operate in the stomach at all : as in particular the

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saliva

^s Vid. Dissertation sur la contagion de la peste. A Toulouse, 1724.

saliva of the mad dog and the venom of the viperⁿ. And therefore Dr. Deidier himself, some months after his former experiments, found that pestiferous bile itself was swallowed by dogs without any harmⁱ.

The right inference to be made from these experiments, I think, would have been this: that since the blood and all the humours are so greatly corrupted in the Plague, as that dogs (though not so liable to catch the distemper in the ordinary way of infection, as men are) may receive it by a small quantity of any of these from a diseased subject being mixed with their blood; it may well be supposed, that the effluvia from an infected person, drawn into the body of one who is sound, may be pestiferous and productive of the like disorder.

My assertion, that these French physicians have before them the fullest proofs of this infection, not only appears from these instances of it, I have observed to be recorded by themselves; but likewise from what Dr. le Moine and Dr. Bailly^k have written, of the manner in which the Plague was brought to Canourgue in the Gevaudan: as also from an amazing instance they give us of the great subtilty of this poison, experienced at Marvejols: where no less than sixty persons were at once infected in a church, by one that came thither out of an infected house. The Plague was carried from Marseilles to Canourgue,

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ⁿ Vid. Mechanical account of Poisons, pag. 37.
ⁱ Vid. Transl. N° 372.

^k Vid. Lettre de Messieurs le Moine & Bailly.

as follows. A gally-slave, employed in burying the dead at Marseilles, escaped from thence to the village of St. Laurent de Rivedolt, a league distant from Cor-rejac : where finding a kinsman, who belonged to the latter place, he presented him with a waistcoat and a pair of stockings he had brought along with him. The kinsman returns to his village, and dies in two or three days ; being followed soon after by three children and their mother. His son, who lived at Canourgue, went from thence, in order to bury the family ; and, at his return, gave to his brother-in-law a cloak he had brought with him : the brother-in-law laying it upon his bed, lost a little child which lay with him, in one day's time ; and two days after, his wife ; himself following in seven or eight. The parents of this unhappy family, taking possession of the goods of the deceased, underwent the same fate.

All this abundantly shews how inexcusable the fore-said physicians in France are, in their opposing the common opinion that the Plague is contagious. However, I have paid so much regard to them, as to insist the more largely upon the proof of that contagion ; lest the opinion of those, who have had so much experience of the disease, might lead any one into an error, in an affair of such consequence, that all my precepts relating to quarantaines, and well nigh every particular part of my advice, depends upon it : for if this opinion were a mistake, quarantaines, and all the like means of defence, ought to be thrown aside as of no use. But as I continue persuaded, that we have the

greatest evidence, that the Plague is a contagious disease ; so I have left, without any alteration, all my directions in respect to quarantines : in which, I hope, I have not recommended any thing prejudicial to trade ; my advice being very little different from what has been long practised in all the trading ports of Italy, and in other places. Nay, were we to be more remiss in this than our neighbours, I cannot think but the fear they would have of us, must much obstruct our commerce.

But I shall pursue this point no farther : the rather because a very learned physician among themselves has since, both by strong reasoning and undeniable instances, evinced the reality of contagion¹.

In a word, the more I consider this matter, the more I am convinced that the precepts I have delivered, both with regard to the preventing the Plague from coming into a country, and the treatment of it when present, are perfectly suitable to the nature of the distemper, and consequently the fittest to be complied with. But how far, in every situation of affairs, it is expedient to grant the powers, requisite for putting all of them in practice, it is not my proper business, as a physician, to determine. No doubt, but at all times, these powers ought to be so limited and restrained, that they may never endanger the rights and liberties of a people. Indeed, as I have had no other
view

¹ Astruc, Dissertation sur la contagion de la peste. A Toulouse, 1724. 8°.

view than the publick good in this my undertaking, and the satisfaction of doing somewhat towards the relief of mankind, under the greatest of calamities; so I should not, without the utmost concern, see that any thing of mine gave the least countenance to cruelty and oppression.

But I must confess, I find no reason for any apprehensions of this kind, from any thing I have advanced. For what extraordinary danger can there be, in lodging powers for the proper management of people under the Plague, with a council of health, or other magistrates, who shall be accountable, like all other civil officers, for their just behaviour in the execution of them? Though this I must leave to those, who are better skilled in the nature of government. But sure I am, that by the rules here given, both the sick will be provided for with more humanity, and the country more effectually defended against the progress of the disease, than by any of the methods heretofore generally put in practice, either in our own, or in other nations.

The usage among us, established by act of parliament, of imprisoning in their houses every family the Plague seizes on, without allowing any one to pass in or out, but such as are appointed by authority, to perform the necessary offices about the sick, is certainly the severest treatment imaginable; as it exposes the whole family to suffer by the same disease; and consequently is little less than assigning them over to the

the cruellest of deaths : as I have shewn in the discourse.

The methods practised in France are likewise obnoxious to great objections. Crowding the sick together in hospitals can serve to no good purpose ; but instead thereof will promote and spread the contagion, and besides will expose the sick to the greatest hardships. It is no small part of the misery, that attends this terrible enemy of mankind, that whereas moderate calamities open the hearts of men to compassion and tenderness, this greatest of evils is found to have the contrary effect. Whether men of wicked minds, through hopes of impunity, at these times of disorder and confusion, give their evil disposition full scope, which ordinarily is restrained by the fear of punishment ; or whether it be, that a constant view of calamities and distress does so pervert the minds of men, as to blot out all sentiments of humanity ; or whatever else be the cause : certain it is, that at such times, when it should be expected to see all men unite in one common endeavour, to moderate the publick misery ; quite otherwise, they grow regardless of each other, and barbarities are often practised, unknown at other times. Accordingly Diemberbroek informs us, that he himself had often seen these hospitals committed to the charge of villains, whose inhumanity has suffered great numbers to perish by neglect, and that sometimes they have even smothered such as have been very weak, or have had nauseous ulcers difficult to cure. Infomuch, that in many places the sick have chose

chose to lay themselves in fields, in the open air, under the flightest coverings, rather than to fall into the barbarous hands of those who have had the management of these hospitals^m.

The rigorous restraints observed at their lines, are attended also with the like inconveniences. For by absolutely denying a passage to people from infected places, they subject to the same common ruin, both from the disease, and from the disorders committed in such places, those, whom their fortunes would otherwise furnish with means of escaping: and this, no doubt, in every free country, must be looked upon as an unjust infringement of liberty, and a diminution of mens natural rights, not to be allowed.

Now, under all these difficulties, I cannot but with the greatest satisfaction observe, that my precepts are well nigh, nay altogether free from them; and yet a proper regard is had to the disease. As soon as ever the sick are grown numerous, I advise, that they be left in their houses, without any of those unmerciful restraints heretofore put upon them and the families they belonged to. I might, perhaps, have justly directed, that whenever those, who frequent or dwell in an infected house, go abroad, they should be obliged to carry about them a long stick of some remarkable colour, or other visible token, by which people may be warned from holding too free converse with them: this being the practice on these occasions, as I have heard, in some places. The removal of the sick

^m Diemerbroek De Peste, p. 120.

sick from their houses, I advise only at the beginning, when it will be attended with none of the forementioned inconveniences : but is what, for the most part, those sick should themselves desire. It has hardly ever been known, when the disease did not first begin among the poor. Such therefore only will be subject to this regulation, whose habitations by the closeness of them are in all respects very incommodious for diseased persons. So that my advice chiefly amounts to the giving relief to the poor, who shall first be infected, by removing them into more convenient lodgings than their own, where they shall be better provided for than at home. And the removal of them will not be attended with that danger, it is natural for the unskilful to apprehend in so dreadful a disease ; because it is every day practised in the small-pox, with great safety. And whereas I have before observed, that people have often suffered in the publick hospitals by the inhumanity of their attendants ; in this case, little or nothing of that kind is to be feared : for I have proposed this removal of the sick only, at a time, when a long series of calamities has not yet bred disorders and hardness of heart. Nay, it may be reasonably expected that they should rather be used with the tenderest care, when every one shall believe the stopping of the distemper, and consequently their own safety to depend upon it. And as this treatment will be both safe and beneficial to the sick, so it will be much more evidently for the advantage of the sound part of the family, and of those who live near them.

For as the poorer sort of people subsist by their daily labour, no sooner shall the Plague have broke out among them, but the sick families, and all their neighbours likewise, if not relieved by the publick, shall be abandoned to perish by want, unless the progress of the distemper put a shorter period to their lives.

This observation, that the Plague usually begins among the poor, was the reason, why I did not make any difference in my directions for removing the sick, in regard to their different fortunes, when I first gave my thoughts upon this subject: which, however, to prevent cavils, I have at present done; and have shewn what method ought to be taken, if by some unusual chance, the Plague should at the beginning enter a wealthy family. And, in this case, I have advised nothing, which I would not most readily submit to myself: for I should much rather chuse to be thus removed from my dwelling, with the distemper upon me, to save my family, than they, by being shut up with me, should be all exposed to perish. And as this way of treating diseased families is the most compassionate that can be devised with any regard to the restraining the progress of the distemper; so it is still much preferable to what was formerly practised amongst us, on other accounts. For, according to what I have advised, it is only required, to remove some few families at the beginning of the disease: whereas the method of shutting up houses was continued through the whole course of the sickness. Perhaps the Plague, under this management, may not reach half a score
G g fami-

families: I have given instances, where it has thus been stopt in one.

What relates to the inclosing infected places with lines, I have so regulated, that no body can be subjected to any degree of hardship thereby: for I have provided, that free liberty be given to every one, that pleases, to depart from the infected place, without being put to any other difficulty, than the performance of a short quarantaine of about three weeks, in some place of safety. So that no one shall be compelled to continue in the infected town, whom his own circumstances will not confine.

This part of my directions is not so general as the rest, because some places are too great to admit of it: which occasioned my proposing it with a restrictionⁿ. But as this is a great inconvenience to the rest of the country, so it is far from being any advantage to the place thus left unguarded. For when all, who leave an infected place, carry with them certificates of their having submitted to such quarantaine, as may remove all cause of suspicion, travelling will be much more safe and commodious, than otherwise it can be. For want of this, when the Plague was last at London, it was difficult to withdraw from it, while the country was every where afraid of strangers, and the inns on the roads were unsafe to lodge in for those, who travelled from the city; when it could not be known, but infection might be received in them by others come from the same place.

And

ⁿ In these words, *Where it can be done*

And from hence it happened that the Plague, when last in England, though much more moderate, and though it continued not above one year in the city of London, did yet spread itself over a great part of England, getting into Kent, even as far as Dover; into Suffex, Hampshire, Dorsetshire, Essex, Suffolk, Norfolk, Cambridgeshire, Northamptonshire, Warwickshire, Derbyshire, and, to mention no more, as far as Newcastle °.

Thus, as I have examined through the course of the following treatise, with all possible care, into the agreement of my precepts with the nature of the Plague; so I have now considered how far they can conveniently be put in practice.

But it is time to have done with a subject by no means agreeable.

I shall therefore conclude all I have to say upon this matter, with a paper well deserving perusal, which is come to my hands, since the following sheets were finished; and therefore too late to be made use of in its proper place: for which reason, I shall give it here entire. This paper contains the methods taken by his late majesty, when the Plague in the year 1712, had entered his dominions in Germany. It was delivered to me from Mr. Backmeister, the secretary at Hanover to his majesty for the German affairs, who was the person, that issued out the orders that were given. This relation I requested from the secretary, being desirous to know how far the measures then taken,

° Vid. the Gazettes of the years 1665 and 1666.

taken, agreed with my directions : because I had been informed, that they were very successful. And I have the satisfaction to find them very conformable to my precepts ; and that they had so much the desired effect, as to stop the Plague from spreading beyond the small number of towns and villages recited at the beginning of the paper.

HANOVER, Feb. 10. N. S. 1722.

IN 1712 and 1713, the Plague raged in these parts, at the following places.

T O W N S.

Lunenbourg, Zell, Haarbours, twice.

V I L L A G E S.

Nienfeldt,	Bienenbittel,	Brinckem,
Holdenstedt,	Achem,	Goldenstedt,
Melle,	Trebel,	Fallingbofel.

In the last place, three labouring men, who had made their escape from Hamburgh, got into a barn in the night, and were found dead there the next morning, with marks of the Plague upon them : but the progress of the infection was stopt by burning the barn.

As soon as any village was infected, the first thing done was to make a line round it, thereby to hinder the inhabitants from communicating with others.

Those who were thus shut up, were immediately furnished with provisions : a physician was sent to them ; and especially some surgeons ; a minister to officiate particularly to persons infected ; a nurse ; buriers, &c.

The principal management of this whole affair consisted in two things : 1. In separating the sick from the sound ; and 2. In cleaning well the houses which had been infected.

When any person was taken ill, he was obliged to leave his lodging, and retire into a lazaretto or hospital, built for that purpose. The other persons, who appeared to be well in the same house, were obliged, when it was practicable, to strip themselves in the night quite naked, to put on other clothes, which were provided for them, and to go to perform quarantine in a house appointed for it, after having burnt the clothes they had put off. Persons were made to change their clothes, and those they put off were burnt, as often as was judged necessary : for example, this was done when those who had recovered their health, came out of the lazaretto and went into quarantine ; and likewise, when (after the disease was ceased) the women who attended the sick, the buriers, and surgeons, went into quarantine.

In summer, ordinary barracks (or huts) were made for those of the common people, who were obliged to quit infected houses : which barracks were afterwards burnt, when they had been made use of.

As soon as the people were come out of an infected house, it was nailed up, and centinels were posted there,

there, that nothing might be stolen out of it. In the country, when such a house was not of very great value, and it might be done without danger, it was burnt, and the loss was made good to the owner, at the expence of the publick. But in towns, where this could not be done, without the hazard of burning the town, men were hired to go into the houses, and bring into the court-yard, or before the house, whatever goods they found in it susceptible of contagion, and there burn them : but to prevent the fright which this might raise among the neighbours, such goods were sometimes put into the cart, used to carry off dead bodies, and so conveyed out of the town and burnt. At first the method taken, was only to bury such goods deep in the ground : but it was found by several examples, that they were dug up again, and that the infection was thereby renewed. Before people were paid for their houses and effects, that were burnt, it was discovered, that they often laid some of their goods out of the way, and that the contagion was spread by them : but after they came to be paid what was reasonable, by the publick, they willingly let all be burnt, without concealing any thing.

In summer, the cattle were left abroad, and the inhabitants, who had not the Plague in their houses, were obliged to look after them : in winter, the sound persons were obliged, before they left an infected house, to kill the cattle belonging to it, and to bury them ten foot deep in the ground near the house.

So far the former preface.

I Think

I Think it now proper to take notice, that an act of parliament (as abovementioned in this preface) formed upon the precepts here delivered, having been passed on December 8, 1720, the two last clauses in the said act, relating to the removing of sick persons from their habitations, and the making of lines about places infected, were on October 19 of the following year, repealed.

This looks as if the rules prescribed were not right and just: I must therefore observe, in justification of myself, that this was not the case. Nothing was urged in that repeal against the reasonableness of the directions in themselves, more than in these words: that the execution of them might be very grievous to the subjects of this kingdom. But this I have proved to be quite otherwise.

The truth of the matter is this: some great men, both of the lords and commons, who were in the opposition to the court, objected that the ministry were not to be intrusted with such powers, lest they should abuse them; since they might, upon occasion, by their officers, either remove or confine persons not favoured by the government, on pretence that their houses were infected.

Vain and groundless as these fears were, yet the clamours industriously raised from them were so strong, that a great officer in the state thought fit to oblige his enemies by giving way to them: and though a motion made in the house of commons for repealing these

two clauses had just been rejected ; yet upon making the same in the house of lords, with his consent, the thing was done.

Whether private or publick considerations had the greater share in bringing about this compliance, I will not determine. Such counter-steps will happen in a government, where there is too much of faction, and too little of a publick spirit. This I very well remember, that a learned prelate, now dead, who had more of political than of christian zeal, and was one who made the loudest noise about the quarantaine bill, frankly owned to me in conversation, that though the directions were good, yet he and his friends had resolved to take that opportunity of shewing their disaffection to the ministry.

But after all, it contributed not a little to the carrying this point, that the Plague was now ceased at Marseilles, and a stop put to its progress in the provinces. And I cannot but take notice, that this last good service was done by the same method, which, though in a more moderate way, I have here proposed. For it is well known that the regent of France did at last set bounds to the contagion by lines and barriers guarded by soldiers : which wise resolution saved not only his own but other countries from the spreading of a disease, which seems to have been of as violent a kind as ever was brought into Europe.

However, if there were any severity in orders of this kind, every man ought to consider himself as a member of the society ; by the laws of which as he receives
many

many advantages, so he gives up somewhat of his own private rights to the publick: and must therefore be perfectly satisfied with whatever is found necessary for the common good; although it may, on particular occasions, bring upon him some inconveniences and sufferings.

Salus Populi suprema Lex est.

Does any body complain of ill usage upon his house being ordered to be blown up, to stop the progress of a fire which endangers the whole street: when he reflects that his neighbour, who by this means escapes, must have suffered the same loss for his sake; had it so happened that each had been in the other's habitation?

But in truth, there is no cruelty, but on the contrary real compassion in these regulations, with the limitations I have made: and I am fully persuaded that whoever with judgment considers the nature of this disease, will easily see that the rules here laid down are not only the best, but indeed the only ones that can effectually answer the purpose. And therefore I should not doubt but that, if this calamity (which God avert!) should be brought into our country, even the voice of the people would cry out for help in this way: notwithstanding wrong notions of their liberties may sometimes over-possess their minds, and make them, even under the best of governments, impatient of any restraints.

P A R T I.

OF THE PLAGUE IN GENERAL.

C H A P. I.

Of the origin and nature of the Plague.

MY design in this discourse being to propose what measures I think most proper to defend the nation against the Plague, and for this end to consider the nature of pestilential contagion as far as is necessary to set forth the reasonableness of the precepts I shall lay down; before I proceed to any particular directions, I shall enquire a little into the causes, whence the Plague arises, and by what means the infection of it is spread.

In the most antient times Plagues, like many other diseases, were looked upon as divine judgments sent to punish the wickedness of mankind: and therefore the only defence sought after was by sacrifices and lustrations to appease the anger of incensed heaven ^a.

How much soever may be said to justify reflexions of this kind, since we are assured from sacred history, that divine vengeance has been sometimes executed by Plagues; yet it is certain, that such speculations pushed too far, were then attended with ill consequences, by obstructing inquiries into natural causes, and encouraging

H h 2

couraging

^a Celsus de Medic. in Præfat. Morbus ad iram deorum immortalium relatus esse, & ab iisdem opem posci solitam.

couraging a supine submission to those evils : against which the infinitely good and wise author of nature has in most cases provided proper remedies.

Upon this account, in after-ages, when the profession of physick came to be founded upon the knowledge of nature, Hippocrates strenuously opposed this opinion, that some particular sicknesses were divine, or sent immediately from the Gods ; and affirmed, that no diseases came more from the Gods than others, all coming from them, and yet all owning their proper natural causes : that the sun, cold, and winds were divine ; the changes of which, and their influences on human bodies, were diligently to be considered by a physician ^b.

Which general position this great author of physick intended to be understood with respect to Plagues as well as other distempers : how far he had reason herein, will in some measure appear, when we come to search into the causes of this disease.

But in order to this inquiry, it will be convenient, in the first place, to remove an erroneous opinion some have entertained, that the Plague differs not from a common fever in any thing besides its greater violence. Whereas it is very evident, that since the small-pox and measles are allowed to be distempers distinct in specie from all others, on account of certain symptoms peculiar to them ; so, for the same reason, it ought to be granted, that the Plague no less differs in kind from ordinary fevers : for there are a set of distinguishing symptoms as essential to the pestilence, as the respective eruptions are to the small-pox or measles ; which are indeed (as I have mentioned in the preface) each of them Plagues of a particular kind.

As the small-pox discharges itself by pustules raised in the skin ; so in the Plague the noxious humour is thrown out either by tumors in the glands, as by a parotis, bubo, and the like ; or by carbuncles thrust out upon any part of the body. And these eruptions are so specifick marks of this distemper, that one or
other

other of them is never absent: unless through the extreme malignity of the disease, or weakness of nature, the patient sinks, before there is time for any discharge to be made this way; that matter, which should otherwise have been cast out by external tumors, seizing the viscera, and producing mortifications in them.

Sometimes indeed it happens, by this means, that these tumors in the glands, and carbuncles, do not appear; just as a bad kind of the small-pox in tender constitutions sometimes proves fatal before the eruption, by a diarrhœa, hæmorrhage, or some such effect of a prevailing malignity.

The French physicians having distinguished the sick at Marseilles into five classes, according to the degrees of the distemper, observed bubo's and carbuncles in all of them, except in those of the first class, who were so terribly seized, that they died in a few hours, or at farthest in a day or two, sinking under the oppression, anxiety, and faintness, into which they were thrown by the first stroke of the disease; having mortifications immediately produced in some of the viscera, as appeared upon the dissection of their bodies^c. And this observation of the French physicians, which agrees with what other authors have remarked in former Plagues, fully proves, that these eruptions are so far from being caused solely by the greater violence of this disease, than of other fevers, that they are only absent, when the distemper is extraordinary fierce; but otherwise they constantly attend it, even when it has proved so mild, that the first notice the patient has had of his infection, has been the appearance of such a tumor: as, besides these French physicians, other authors of the best credit have assured us. From whence we must conclude, that these eruptions are no less a specifick mark of this disease, than those are, by which the small-pox and measles are known and distinguished. And as in the first class of those attacked

^c Observat. & Reflex. touchant la nature, &c. de la Peste de Marseilles, pag. 47, & suiv.

tacked with the Plague, so likewise in these two distempers we often find the patient to die by the violence of the fever, before any eruption of the pustules can be made.

This circumstance of the Plague being mortal before any eruptions appeared, was attended with a great misfortune. The physicians and surgeons appointed to examine the dead bodies, finding none of the distinguishing marks of the disease, reported to the magistrates that it was not the Plague; and persisted in their opinion, till one of them suffered for his ignorance, and himself, with part of his family, died by the infection: this assurance having prevented the necessary precautions ^d.

And this in particular shews us the difference between the true Plague, and those fevers of extraordinary malignity, which are the usual fore-runners of it, and are the natural consequence of that ill state of air, we shall hereafter prove to attend all Plagues. For since all those fevers, from which people recover without any discharge by tumors in the glands, or carbuncles, want the characteristick signs, which have been shewn to attend the slightest cases of the true Plague; we cannot, upon any just ground, certainly conclude them to be a less degree only of that distemper: but as far as appears, they are of a different nature, are not ordinarily contagious like the Plague, nor yet have any such necessary relation to it, but that such fevers do sometimes appear, without being followed by a real pestilence.

On the other hand, I would not be understood to call every fever a Plague, which is followed by eruptions resembling these here mentioned: for as every boil or pustule, which breaks out upon the skin, is not an indication of the small-pox, nor every swelling in the groin a venereal bubo; so there are carbuncles not pestilential, and other fevers, besides the Plague, which have their crisis by tumors and abscesses, and that sometimes even in the parotid or other glands. There is indeed usually some difference between these swellings in the Plague, and in other

^d Journal de la Contagion à Marseille, pag. 6.

other fevers, especially in the time of their coming out : for in the Plague they discover themselves sooner than in most other cases. But the principal difference between these diseases, is, that the Plague is infectious, the other not ; at least not to any considerable degree.

And this leads me to another character of this disease, whereby it is distinguished from ordinary fevers, which is the contagion accompanying it. This is a very antient observation. Thucydides makes it a part of his description of the Plague at Athens^c ; and Lucretius, who has almost translated this description of Thucydides, dwells much upon it^f. Aristotle makes it one of his problems^g, How the Plague infects those who approach

^c Lib. 2. "Οτι ἔτερον ἂν ἰτέρω, θεραπεΐας ἀναπιμπλάμενοι, ὥσπερ τὰ πρόβατα ἔθνησκον· καὶ τὴν πλεῖστον φόβον τῷτο ἐνεποίει· ἔτε γὰρ μὴ θέλοιεν δεδιότες ἀλλήλοις προσιέναι, ἀπώλλυτο ἕρημοι, καὶ οἰκίαι πολλὰ ἐκενώθησαν ἀπορία τῇ θεραπεύσαι· εἴτε προσίοιεν, διαφείροιστο, καὶ μάλιστα οἱ ἀρετῆς τι μελαπτομένοι. The beginning of this passage, as it here stands, though it is found thus in all the editions of Thucydides, is certainly faulty, θεραπεΐας ἀναπιμπλάμενοι being no good sense. The sentence I shall presently cite from Aristotle shews that this may be rectified only by removing the comma after ἰτέρω, and placing it after θεραπεΐας ; for προσαναπίμπλημι in Aristotle absolutely used signifies to infect. With this correction, the sense of the place will be as follows : The people took infection by their attendance on each other, dying like folds of sheep. And this effect of the disease was the principal cause of the great mortality : for either the sick were left destitute, their friends fearing to approach them, by which means multitudes of families perished without assistance ; or they infected those who relieved them, and especially such, whom a sense of virtue and honour obliged most to their duty.

The sense here ascribed to the word ἀναπίμπλημι, is confirmed yet more fully by a passage in Livy, where he describes the infection attending a Plague or camp fever, which infested the armies of the Carthaginians and Romans at the siege of Syracuse, in such words, as shew him to have had this passage of Thucydides in view ; for he says, *aut neglecti desertique, qui incidissent, morerentur ; aut assidentes curantesque eadem vi morbi repletos secum traherent.* Lib. xxv. c. 26.

^f Lib. vi. §. 1234.

— nullo cessabant tempore apiscī
Ex aliis alios avidi contagia morbi.

Et §. 1241.

Qui fuerant autem præsto, Contagibus ibant.

^g Sect. 1. Διὰ τί ποτε ὁ λοιμὸς μόνη τῶν νόσων μάλιστα τὰς πλεονάζουσας τοῖς θεραπευμένοις προσαναπίμπλησι ;

proach to the sick. And what is of more consequence, Galen himself is very clear in it^b; for he has these words: ὅτι συνδιατρίβειν τοῖς λοιμώτεσιν ἐπισφαλές, ἀπολαῦσαι γὰρ κίνδυνος, ὥσπερ ψώρας τινός, &c. that it is unsafe to be about those, who have the Plague, for fear of catching it, as in the itch, &c. Indeed this is a thing so evident, that we find it at present the current opinion of all mankind, a very few persons only excepted, who have distinguished themselves by their singularity in maintaining the opposite sentiment. And it is something strange that any one should make a question of a thing so obvious, which is proved sufficiently by one property only of the disease, that whenever it seizes one person in a house, it immediately after attacks the greatest part of the family. This effect of the Plague has been so remarkable at all times, that whoever considers it well, cannot possibly, I think, have any doubt remaining, or require any stronger argument to convince him, that the disease is infectious. For this very reason the small-pox and measles are generally allowed to be contagious; because it is observed, that when either of these diseases is got among a family, it usually seizes successively the greatest part of that family, who have not had it before: at least if such in the family hold free communication with the sick. And by the same argument the Plague must be concluded to be infectious likewise. It cannot be pretended, that this is occasioned in the Plague from this only, that the sound persons are rendered more than ordinarily obnoxious to the unhealthy air, or whatever be the common cause of the disease, by being put into fear and dispirited, upon seeing others in the same house taken sick: for if this were the case, children, who are too young to have any apprehensions upon this account, would escape better than others, the contrary of which has been always experienced.

It is true, some have not been attacked by the disease, though constantly attending about the sick. But this is no objection
against

^b Περὶ διαφορῶν πυρετῶν, βιβ. α.

against what is here advanced: for it is as easily understood how some persons, by a particular advantage of constitution, should resist infection, as how they should constantly breathe a noxious air without hurt. An odd observation of Diemberbrook deserves notice in this place; That, part of a family removed into a town free from the Plague, was observed by him to be taken ill of it soon after the part left behind in the diseased town fell sick: which certainly would scarce have happened, unless a communication between the healthy and the sick, by letters or otherwise, was capable of causing it^h. Of the same nature is a circumstance recorded by Evagrius of the Plague, which he describes, and what, he owns, surprized him very much: that, many of those, who left infected places, were seized with the Plague in the towns to which they had retired, while the old inhabitants of those towns were free from the diseaseⁱ. But to multiply proofs of a thing so evident, is needless; innumerable are at hand, and several will occasionally occur in the following parts of this discourse, when we come to speak in particular of the ways, by which this infection is conveyed about. I shall therefore say no more in this place, but only, that all the appearances attending this disease are very easily explained upon this principle, and are hardly to be accounted for upon any other. We learn from hence the reason why when the Plague makes its first appearance in any place, though the number of sick is exceeding small, yet the disease usually operates upon them in the most violent manner, and is attended with its very worst symptoms. Now was the disease produced not by imported contagion, but from some cause, which had its original in the diseased place, and consequently from a cause gradually bred, the contrary must happen: the diseased would at first not only be few in number, but their sickness likewise more moderate than afterwards, when the morbidick causes were raised to their greatest malignity. From the same principle we see the reason,

I i

why

^h De Peste, c. iv. annot. 6.ⁱ Evagrii Histor. Eccles. lib. iv. c. 29.

why people have often remained in safety in a diseased town, only by shutting themselves up from all communication with such, as might be suspected of giving them the disease. When the Plague was last in England, while it was in the town of Cambridge, the colleges remained entirely free by using this precaution. In the Plague at Rome in the years 1656 and 1657, the monasteries and nunneries, for the most part, defended themselves by the same means^{*}: whereas at Naples, where the Plague was a little before, these religious houses, from their neglect herein, did not escape so well¹. Nay the infection entered none of the prisons at Rome^m, though the nastiness of those places exposes them very much. But, to avoid prolixity, I shall give only one instance more. I think it cannot be explained in any other reasonable manner, how the last Plague in the city of London, which broke out in the parish of St. Giles's in the Fields towards the latter end of the year 1664, should lie asleep from Christmas to the middle of February, and then break out again in the same parish; and after another long rest till April, shew itself again in the same placeⁿ.

To proceed: whoever examines the histories of Plagues in all times, which have been described with any exactness, will find very few, that do not agree in these essential marks, whereby the Plague may be distinguished from other fevers. I confess an instance or two may be found to the contrary: perhaps the history of our own country furnishes the most remarkable of any^o. But examples of this kind are so very rare, that I think it must be concluded, that the Plague is usually one and the same distemper.

In the next place I shall endeavour to shew, that the Plague has always the same original, and is brought from Africa, the country which has entailed upon us two other infectious distempers,

^{*} Gaftaldi De avertenda & profliganda Peste, p. 117.

¹ Ibid. p. 118.

^m Ibid. p. 117.

ⁿ See Bills of Mortality for the year 1665.

^o The

sweating sickness.

pers, the small-pox and measles. In all countries indeed epidemick diseases extraordinarily mortal, are frequently bred in Jails, sieges, camps, &c. which authors have often in a large sense called pestilential: but the true Plague, which is attended with the distinguishing symptoms before described, and which spreads from country to country, I take to be an African fever bred in Æthiopia or Egypt, and the infection of it carried by trade into the other parts of the world.

It is the observation of Pliny, that the pestilence always travels from the southern parts of the world to the western, that is, in his phrase, into Europe ^p. And the most accurate accounts in all times of this disease, wherever it has raged, bring it from Africa. Thucydides ^q, in his admirable description of the famous Plague of Athens, says, that it began in Upper Æthiopia, then came into Egypt, from whence it was spread first into Persia, and afterwards into Greece.

There is in all antient history no account of any Plague so dreadful as that, which broke out at Constantinople in the time of the emperor Justinian, A. D. 543. This is said to have spread its infection over all the earth, and to have lasted fifty-two years. The history of it is very well told by Evagrius ^r, and yet more learnedly by Procopius ^s: and they both observe, that the distemper had its birth in Æthiopia or Egypt.

This is likewise agreeable to the modern relations of travellers and merchants from Turkey, who generally inform us, that the frequent Plagues, which depopulate that country, are brought thither from the coast of Africa: insomuch that at Smyrna, and other ports of that coast, they often know the very ship which brings it. And, in these latter ages, since our trade with Turkey has been pretty constant, the Plagues in these parts of Europe have evidently been brought from thence.

I i 2

The

^p Nat. Hist. lib. vii. c. 50.
lib. iv. c. 29.

^q Histor. lib. ii.

^s De Bello Persico, lib. ii. c. 22.

^r Histor. Ecclesiast.

The late Plague in France came indisputably from Turkey, as I shall particularly shew in some of the following pages. The Plague, which broke out at Dantzick in the year 1709, and spread from thence to Hamburgh, Copenhagen, and other cities in the north, made its way thither from Constantinople through Poland, &c. And the last Plague in this city, if we may believe Dr. Hodges, had the same original, being brought to us from Holland, but carried to them by cotton imported from Turkey[†].

The greatest mortality that has happened in latter ages, was about the middle of the fourteenth century; when the Plague seized country after country for five years together[‡]. In the year 1346 it raged in Egypt, Turkey, Greece, Syria, and the East-Indies; in 1347 some ships from the Levant carried it to Sicily, Pisa, Genoa, &c. in 1348 it got into Savoy, Provence, Dauphiny, Catalonia, and Castile, &c. in 1349 it seized England, Scotland, Ireland, and Flanders; and the next year Germany, Hungary, and Denmark: and in all places, where it came, it made such heavy destruction, that it is said to have dispeopled the earth of more than half its inhabitants[§]. Now since Africa had a share of this Plague in the very beginning, I question not but it had its first rise in that country; and not in China, as M. Villani, in his history of those times, relates from the report of Genoese seamen, who came from those parts, and said it was occasioned there by a great ball of fire, which either burst out of the earth, or fell down from heaven[¶]. But this relation is so very incredible, that I cannot think we ought at all to rely upon it: seeing we have no instance of a Plague, which was originally bred in that country.

It is very remarkable, that the several countries of Europe have always suffered more or less in this way, according as they had

[†] Vid. Hodges De Peste.

[‡] Vid. Istorie di Matteo Villanni, l. i. c. 2.

[§] Mezeray Hist. de France, Tom. i. p. 798.

[¶] Villanni, loco citato.

had a greater or lesser commerce with Africa; or with those Parts of the east that have traded thither. Which observation, by the by, may help to solve a difficulty concerning the great increase of people among the northern nations in antient times, more than at present; for in those ages, having no communication at all with Africa, they were not wasted with Plagues, as they have been since.

As the people of Marseilles, from the first foundation of their city by the Phoceans, were famous for trade, and made long voyages southwards on the African coast^z; so they have in all times been very liable to the Plague. A French author^a, in a history of the late Plague at Marseilles, reckons up twenty Plagues that have happened in that city; notwithstanding it is by its situation one of the most healthy and pleasant places in France, and the least subject to epidemick distempers. But if we had no records of this in history, an odd custom among them, mentioned in antiquity^b, of the way they made use of to clear themselves from this distemper, would be a proof of it. Their manner at such times was, that some one poor man offered himself to be maintained at the publick expence with delicate food for a whole year: at the end of which he was led about the city dressed in consecrated garments and herbs; and being loaded with curses as he went along, that the evils of the citizens might fall upon him, he was at last thrown into the sea^c.

Agree-

^z Vid. Huet. Histoire du Commerce des Anciens, p. 88. ^a Relation Historique de tout ce qui s'est passé à Marseille pendant la dernière Peste. ^b Vid.

Serv. Comment. in Virgil. Æneid, lib. iii. v. 57. ^c This was a kind of expiatory sacrifice, as the scape-goat among the Jews, Lev. xvi. And the wretches thus devoted to die for the sins of the people were called *καθάρα*, Purgations. Vid. Aristophan. in Plut. ver. 454. & in Equit. ver. 1133. & Scholiast. ibid. Suidas adds, that when the sacrificed person was cast into the water, these words were pronounced, *Περίψημα ἡμῶν γινεῖ*, Be thou our cleansing. And I observe, by the by, that the apostle Paul, 1 Corinth. iv. 13. alluding very probably to this wicked custom, makes use of both these words, where speaking of himself in the plural number,

Agreeable to this remark upon trade is the observation of Procopius in his forecited history, that the Plague was always found to spread from maritime places into the inland countries : which has ever since been confirmed by experience.

Having shewn this disease to be a distemper of a distinct Species, and to take its rise only in Africa ; we must next seek for its cause in that country, and no where else. We ought therefore to consider, what there is peculiar to that country, which can reasonably be supposed capable of producing it. Wherefore I shall briefly set down as much as serves for this purpose of the state of Grand Cairo in Egypt, and of Æthiopia, the two great seminaries of the Plague : travellers relating that these countries are more infested with it than most other parts of Africa.

Grand Cairo is crouded with vast numbers of inhabitants, who for the most part live very poorly, and nastily ; the streets are very narrow, and close : it is situate in a sandy plain at the foot of a mountain, which by keeping off the winds, that would refresh the air, makes the heats very stifling. Through the midst of it passes a great canal, which is filled with water at the overflowing of the Nile ; and after the river is decreased, is gradually dried up : into this the people throw all manner of filth, carrion, &c. so that the stench which arises from this, and the mud together, is insufferably offensive ^d. In this posture of things, the Plague every year constantly preys upon the inhabitants ; and is only stopt, when the Nile, by overflowing, washes away this load of filth ; the cold winds, which set in at the same time, lending their assistance, by purifying the air.

In Æthiopia those prodigious swarms of locusts, which at some times cause a famine, by devouring the fruits of the earth, unless

number, he says, Ὡς περικατάβουλα τὸ κόσμῳ ἐγενήθημεν, πάντων περίφημα ; for some of the best MSS. instead of Ὡς περικατάβουλα, read ὥσπερ, or ὥσπερ ἐπὶ κατάβουλα ; that is, We have been looked upon as wretches fit only to be sacrificed for the publick good, and cast out of the world by way of atonement for the sins of the whole society.

^d Vid. Le Brun Voyage au Levant, c. xxxviii.

unless they happen to be carried by the winds clear off into the sea, are observed to entail a new mischief upon the country, when they die and rot, by raising a pestilence^e; the putrefaction being heightened by the excessive intemperance of the climate, which is so very great in this country, that it is infested with violent rains at one season of the year, for three or four months together^f. And it is particularly observed of this country, that the Plague usually invades it, whenever rains fall during the sultry heats of July and August^g, that is, as Lucretius expresses it, when the earth is

Intempestivis pluviisque & solibus icta^h.

Now if we compare this last remark of the intemperance of the climate in Æthiopia, with what the Arabian physiciansⁱ, who lived near these countries, declare, that pestilences are brought by unseasonable moistures, heats, and want of winds; I believe we shall be fully instructed in the usual cause of this disease. Which from all these observations compared together, I conclude to arise from the putrefaction so constantly generated in these countries, when that is heightened and increased by the ill state of air now described; and especially from the putrefaction of animal substances.

It is very plain, that animal bodies are capable of being altered into a matter fit to breed this disease: because this is the case of every one who is sick of it, the humours in him being corrupted into a substance which will infect others. And it is not improbable, that the volatile parts with which animals abound, may in some ill states of air in the sultry heats of Africa be converted by putrefaction into a substance of the same kind: since in these colder regions, we sometimes find them to contract a greater degree of acrimony than most other substances will do

^e Vid. Ludolf. Hiftor. Æthiop. lib. i. c. 13. & D. August. De civitat. Dei, lib. iii.

c. ult. ^f Vid. Ludolf. Hiftor. Æthiop. lib. i. c. 5. & comment. ^g J. Leo

Hift. Afric. lib. i. ^h Lib. vi. p. 1100. ⁱ Rhaf. & Avicen.

by putrefying, and also more dangerous for men to come within the reach of their action; as in those pernicious, and even poisonous juices, which are sometimes generated in corrupted carcasses: of which I have formerly given one very remarkable instance^k, and, if it were necessary, many more might be produced, especially in hydropick bodies, and in cancerous tumours. Nay more, we find animal putrefaction sometimes to produce in these northern climates very fatal distempers, though they do not arise to the malignity of the true Plague: for such fevers are often bred, where a large number of people are closely confined together; as in jails, sieges, and camps.

And perhaps it may not be here amiss to remark, that the Egyptians of old were so sensible how much the putridness of dead animals contributed towards breeding the Plague, that they worshipped the bird Ibis for the service it did in devouring great numbers of serpents; which they observed did hurt by their stench when dead, as well as by their bite when alive^l.

But no kind of putrefaction is ever heightened in these European countries to a degree capable of producing the true Plague: and we learn from the observation of the Arabian physicians, that some indisposition of the air is necessary in the hottest climates, either to cause so exalted a corruption of the fore-mentioned substances, or at least to enforce upon mens bodies the action of the effluvia exhaled from those substances, while they putrefy. Both which effects may well be expected from the sensible ill qualities of the air before described, whenever they continue and exert their force together any considerable time.

What I have here advanced of the first original of the Plague, appears to me so reasonable, that I cannot enough wonder at authors for quitting the consideration of such manifest causes for hidden

^k Essay on Poisons.

^l Cicero de Nat. Deor. lib. i. § 36. speaking of these birds, says: *Avertunt Pestem ab Ægypto, cum volucres angues ex vastitate Libyæ vento Africo invehctas interficiunt atque consumunt; ex quo fit ut illæ nec morsu vivæ noceant, nec odore mortuæ.*

hidden qualities ; such as malignant influences of the heavens : arsenical, bituminous, or other mineral effluvia, with the like imaginary or uncertain agents.

This however I do not say with design absolutely to exclude all disorders in the air, that are more latent than the intemperate heat and moisture before-mentioned, from a share in increasing and promoting the infection of the Plague, where it is once bred : for I rather think this must sometimes be the case ; like to what is observed among us in relation to another infectious distemper, namely, the small-pox, which is most commonly spread, and propagated by the same manifest qualities of the air as those here described : notwithstanding which, this distemper is sometimes known to rage with great violence in the very opposite constitution of air, *viz.* in the winter during dry and frosty weather. But to breed a distemper, and to give force to it when bred, are two different things. And though we should allow any such secret change in the air to assist in the first production of the disease ; yet it may justly be censured in these writers, that they should undertake to determine the specifick nature of these secret changes and alterations, which we have no means at all of discovering : since they do not shew themselves in any such sensible manner, as to come directly under our examination ; nor yet do their effects, in producing the Plague, point out any thing of their specifick nature.

All that we know is this, that the cause of the Plague, whatever it be, is of such a nature, that when taken into the body, it works such changes in the blood and juices, as to produce this disease, by suddenly giving some parts of the humours such corrosive qualities, that they either excite inward inflammations and gangrenes, or push out carbuncles and bubo's ; the matter of which, when suppurated, communicates the like disease to others : but of the manner how this is done, I shall discourse in the following chapter.

C H A P. II.

Of the causes which spread the Plague.

I HAVE been thus particular in tracing the Plague up to its first origin, in order to remove, as much as possible, all objection against what I shall say of the causes, which excite and propagate it among us. This is done by contagion. Those who are strangers to the full power of this, that is, those who do not understand how subtle it is, and how widely the distemper may be spread by infection, ascribe the rise of it wholly to the malignant quality of the air in all places, wherever it happens; and, on the other hand, some have thought that the consideration of the infectious nature of the disease must exclude all regard to the influence of the air: whereas the contagion accompanying the disease, and the disposition of the air to promote that contagion, ought equally to be considered; both being necessary to give the distemper full force. The design therefore of this chapter, is to make a proper ballance between these two, and to set just limits to the effects of each.

For this purpose, I shall reduce the causes, which spread the Plague, to three, diseased persons, goods transported from infected places, and a corrupted state of air.

There are several diseases, which will be communicated from the sick to others: and this not done after the same manner in all. The hydrophobia is communicated no other way than by mixing the morbid juices of the diseased animal immediately with the blood of the sound, by a bite, or what is analogous thereto; the itch is given by simple contact; the lues venerea not without a closer contact; but the measles, small-pox, and Plague, are caught by a near approach only to the sick: for in these

these three last diseases persons are rendered obnoxious to them only by residing in the same house, and conversing with the sick.

Now it appears by the experiments mentioned in the preface, of giving the Plague to dogs by putting the bile, blood or urine from infected persons, into their veins, that the whole mass of the animal fluids in this disease is highly corrupted and putrefied. It is therefore easy to conceive how the effluvia or fumes from liquors so affected may taint the ambient air. And this will more especially happen, when the humours are in the greatest fermentation, that is, at the height of the fever: as it is observed that fermenting liquors do at the latter end of their intestine motion throw off a great quantity of their most subtle and active particles. And this discharge will be chiefly made upon those glands of the body, in which the secretions are the most copious, and the most easily increased: such are those of the mouth and skin. From these therefore the air will be impregnated with pestiferous atoms: which being taken into the body of a sound person will, in the nature of a ferment, put the fluids there into the like agitation and disorder.

The body, I suppose, receives them these two ways, by the breath, and by the skin; but chiefly by the former.

I think it certain that respiration does always communicate to the blood some parts from the air: which is proved from this observation, that the same quantity of air will not suffice long for breathing, though it be deprived of none of those qualities, by which it is fitted to inflate the lungs and agitate the blood, the uses commonly ascribed to it. And this is farther confirmed by what the learned Dr. Halley has informed me, that when he was several fathom under water in his diving-engine, and breathing an air much more condensed than the natural, he observed himself to breathe more slowly than usual: which makes it more than probable, that this conveying to the blood some subtle parts from the air, is the chief use of respiration; since when a greater quantity of air than usual was taken in at a time, and

consequently more of these subtil parts received at once by the blood, a less frequent respiration sufficed.

As to the skin, since there is a continual discharge made through its innumerable pores, of the matter of insensible perspiration and sweat; it is very possible that the same passages may admit subtil corpuscles, which may penetrate into the inward parts. Nay it is very plain that they do so, from what we observe upon the outward application of ointments and warm bathings: which have their effects by their finest and most active parts insinuating themselves into the blood.

It is commonly thought, that the blood only is affected in these cases by the morbisick effluvia. But I am of opinion, that there is another fluid in the body, which is, especially in the beginning, equally, if not more, concerned in this affair: I mean the liquid of the nerves, usually called the animal spirits. As this is the immediate instrument of all motion and sensation, and has a great agency in all the glandular secretions, and in the circulation of the blood itself; any considerable alteration made in it must be attended with dangerous consequences. It is not possible that the whole mass of blood should be corrupted in so short a time as that, in which the fatal symptoms, in some cases, discover themselves. Those patients of the first class, mentioned in the beginning of this discourse, particularly the porters who opened the infected bales of goods in the lazaretto's of Marseilles, died upon the first appearance of infection, as it were by a sudden stroke; being seized with rigours, tremblings, heart-sickness, vomitings, giddiness and heaviness of the head, an universal languor and inquietude; the pulse low and unequal: and death ensued sometimes in a few hours.

Effects so sudden must be owing to the action of some corpuscles of great force insinuated into, and changing the properties of, another subtil and active fluid in the body; and such an one, no doubt, is the nervous liquor.

It is not to be expected that we should be able to explain the particular manner by which this is brought about. We know too little of the frame of the universe, and of the laws of attractions, repulsions and cohesions among the minutest parcels of matter, to be able to determine all the ways by which they affect one another, especially within animal bodies, the most delicate and complicated of all the known works of nature. But we may perhaps make a probable conjecture upon the matter. Our great philosopher, whose surprising discoveries have exceeded the utmost expectations of the most penetrating minds, has demonstrated that there is diffused through the universe a subtile and elastick fluid of great force and activity. This he supposes to be the cause of the refraction and reflection of the rays of light; and that by its vibrations light communicates heat to bodies: and, moreover, that this readily pervading all bodies, produces many of their effects upon one another^a.

Now it is not improbable that the animal spirits are a thin liquor, separated in the brain, and from thence derived into the nerves, of such a nature that it admits, and has incorporated with it, a great quantity of this elastick fluid: which makes it a vital substance of great energy. And a liquor of this kind must be very susceptible of alterations from other active bodies of a different nature from it, if they approach to and are mixed with it: as we see some chemical spirits upon their being put together, fall into a fermentation, and make a composition of a quite different kind.

If therefore we allow the effluvia or exhalations from a corrupted mass of humours in a body that has the Plague to be volatile and firey particles, carrying with them the qualities, of those fermenting juices from which they proceed; it will not be hard to conceive how these may, when received into the nervous fluid of a sound person, excite in it such intestine motions as may make it to partake of their own properties, and become

more

^a Newton's Opticks, Qu. 18 to 24.

more unfit for the purposes of the animal œconomy. But of this more in another place.

This is one means by which the Plague, when once bred, is spread and increased: but the second of the forementioned causes, namely, goods from infected places, extends the mischief much wider. By the preceding cause, the Plague may be spread from person to person, from house to house, or perhaps from town to town, though not to any great distance; but this carries it into the remotest regions. From hence the trading parts of Europe have their principal apprehensions, and universally have recourse to quarantaines for their security. The universality of which practice is a strong argument, that merchandize will communicate infection: for one cannot imagine, that so many countries should agree in such a custom without the most weighty reasons. But besides, there is not wanting express proof of this, from particular examples, where this injury has been done by several sorts of goods carried from infected places to others. Some of these I shall hereafter be obliged to mention; at present I shall confine myself to three instances only. The first shall be of the entrance of the Plague into Rome in the year 1656, which we are assured was conveyed thither from Naples by clothes and other wares from that place, brought first to port Neptuno, and carried from thence to the neighbouring castle of St. Lawrence: which after having been kept some time there, were conveyed into Rome^b. The second instance I shall take is from the account given us of the entrance of the Plague into Marseilles^c; which being drawn up with great exactness, may be the more relied on. It appears indisputably by this account, that the mischief was brought thither by goods from the Levant. For the first, who had the distemper, was one of the crew of the ship, which brought those goods: the next were those, who attended upon the same goods, while they were under quarantine;

^b Gastaldi, De Peste, p. 116.
seilles, &c.

^c Journal de ce qui s'est passé à Mar-

taine; and soon after the surgeon, whom the magistrates of Marseilles appointed to examine the bodies of those who died.

This relation, if duly considered, is, I believe, sufficient to remove all the doubts any one can have about the power of merchandize to convey infection: for it affords all the evidence, the most scrupulous can reasonably desire. Possibly there might be some fever of extraordinary malignity in Marseilles, such as is commonly called pestilential, before the arrival of these goods: but no such fever has any disputable right to the title of pestilence, as I have before shewn. On the contrary, these two, the real pestilence, and such pestilential fevers, must carefully be distinguished, if we design to avoid all mistakes in reasoning upon these subjects.

Some such fever of uncommon malignity, I say, might perhaps be in Marseilles before the arrival of these goods. There might likewise perhaps be an instance or two of fevers attended with eruptions, bearing some resemblance to those of the Plague: for such I myself have sometimes seen here in London. But it is not conceivable, that there should be any appearance of the true Plague before that time: for it was full six weeks from the time of the sailor's death, which had given the alarm, and raised a general attention, before the magistrates received information of any one's dying of the Plague in the city. And I believe it was never known, that the Plague, being once broke out, gave so long a truce in hot weather.

The Plague, which has this present year almost depopulated Messina, affords a third instance of the same kind. By an authentick relation of it, published here^d we are informed, that a Genoese vessel from the Levant, arrived at that city; and upon notice given that a sailor, who had touched some cases of cotton stuffs bought up at Patrasso in the Morea, where the distemper then raged, was dead of the Plague, in the voyage; the
ship

^d Vid. The London Gazette, July 23. 1743.

ship was put under quarantaine : during which time the cotton stuffs were privately landed. The master and some sailors dying three days after, the vessel was burnt. These goods lay for some time concealed, but were soon after publicly sold : upon which the disease immediately broke out in that quarter where they were opened ; and afterwards was spread through the whole city.

I think it not improper, for the fuller confirmation of the present point, to give a relation communicated to me by a person of unquestionable credit, of the like effect from goods, in respect to the small-pox ; which distemper is frequently carried in the nature of the Plague both to the East and West-Indies from these countries, and was once carried from the East-Indies to the Cape of Good Hope, in the following manner. About the year 1718, a ship from the East-Indies arrived at that place : in the voyage three children had been sick of the small-pox : the foul linen used about them was put into a trunk, and locked up. At the ship's landing, this was taken out, and given to some of the natives to be washed : upon handling the linen, they were immediately seized with the small-pox, which spread into the country for many miles, and made such a desolation, that it was almost dispeopled.

It has been thought so difficult to explain the manner how goods retain the seeds of contagion, that some ^e authors have imagined infection to be performed by the means of insects ; the eggs of which may be conveyed from place to place, and make the disease when they come to be hatched. But as this is a supposition grounded upon no manner of observation, so I think there is no need to have recourse to it. If, as we have conjectured, the matter of contagion be an active substance generated chiefly from animal corruption ; it is not hard to conceive how this may be lodged and preserved in soft porous bodies, which are kept pressed close together.

We

^e Kircher, Langius, &c.

We all know how long a time perfumes hold their scent, if wrapt up in proper coverings : and it is very remarkable, that the strongest of these, like the matter we are treating of, are mostly animal juices, as musk, civet, &c. and that the substances, found most fit to keep them in, are the very same with those, which are most apt to receive and communicate infection, as furs, feathers, silk, hair, wool, cotton, flax, &c. the greatest part of which are likewise of the animal kind.

Nothing indeed can give us so just a notion of infection, and more clearly represent the manner of it, than odoriferous bodies. Some of these do strangely revive the animal spirits ; others instantaneously depress and sink them : we may therefore conceive that, what active particles emitted from any such substances do, is in the like way done by pestiferous bodies ; so that contagion is no more than the effect of volatile offensive matter drawn into the body by our smelling.

The third cause we assigned for the spreading of contagion, was a corrupted state of air. Although the air be in a right state, yet a sick person may infect those who are very near him : as we find the pestilence to continue sometimes among the crew of a ship, after they have sailed out of the infectious air wherein the disease was first caught. A remarkable accident of this nature is recorded to have happened in the Plague at Genoa in the year 1656. Eleven persons put to sea in a felucca, with design to withdraw themselves from the contagion, and retire into Provence ; but one of them falling sick of the Plague soon after they had embarked, infected the rest ; insomuch that others being taken ill, and dying in their turns, they were not admitted any where, but were forced to return from whence they came : and by that time the boat arrived again at Genoa no more than one of them survived ^f.

However in this case the malady does not usually spread far, the contagious particles being soon dispersed and lost. But when in a corrupt disposition of the air the contagious particles meet with the subtile parts generated by that corruption, by uniting with them they become much more active and powerful, and likewise of a more durable nature: so as to form an infectious matter capable of conveying the mischief to a greater distance from the diseased body, out of which it was produced.

In general, a hot air is more disposed to spread contagion than a cold one, as no one can doubt, who considers how much all kinds of effluvia are farther diffused in a warm air, than in the contrary. But moreover, that state of air, when unseasonable moisture and want of winds are added to its heat, which gives birth to the Plague in some countries, will doubtless promote it in all. For Hippocrates sets down the same description of a pestilential state of air in his country, as the Arabians do of the constitution, which gives rise to the Plague in Africa^z. Mercurialis assures us the same constitution of air attended the pestilence in his time at Padua^h: and Gassendus observed the same in the Plague of Digneⁱ. Besides, it is easy to shew how the air, by the sensible ill qualities discoursed of in the last chapter, should favour infectious diseases, by rendering the body obnoxious to them.

Indeed other hurtful qualities of the air are more to be regarded than its heat alone: for the Plague is sometimes stopt, while the heat of the season increases, upon the emendation of the air in other respects. At Smyrna the Plague, which is yearly carried thither by ships, constantly ceases about the 24th of June, by the dry and clear weather they always have at that time:

^z Hippocr. Epid. l. iii. That Hippocrates describes here the constitution of air accompanying the true Plague, contrary to what some have thought, Galen testifies in his comment upon this place, in libr. De Temper. l. i. c. 4. and in lib. De differentiis Febr. lib. i. c. 4. ^h Vid. Mercurial. Prælect. De Pestilent. ⁱ Notitia Eccles. Dinienfis.

time: the unwholesome damp being then dissipated that annoy the country in the spring. However, the heat of the air is of so much consequence, that if any ship brings it in the winter months of November, December, January, or February, it never spreads; but if later in the year, as in April or afterwards, it continues till the time beforementioned.

But moreover, what was said before of some latent disorders in the air having a share in spreading the Plague, will likewise have place in these countries; as the last Plague in the city of London remarkably proves, the seeds of which, upon its first entrance, and while it was confined to a house or two, preserved themselves through a hard frosty winter, and again put forth their malignant quality as soon as the warmth of the spring gave them force: but, at the latter end of the next winter they were suppressed so as to appear no more, though in the month of December more than half the parishes of the city were infected.

A corrupted state of air is, without doubt, necessary to give these contagious atoms their full force; for otherwise it were not easy to conceive how the Plague, when once it had seized any place, should ever cease but with the destruction of all the inhabitants: which is readily accounted for by supposing an emendation of the qualities of the air, and the restoring of it to a healthful state capable of dissipating and suppressing the malignity.

On the other hand, it does not appear, that the air, however corrupted, is usually capable of carrying infection to a very great distance; but that commonly the Plague is spread from town to town by infected persons and goods: for there are numberless instances, where the Plague has caused a great mortality in town, while other towns and villages, very near them, have been entirely free. And hence it is, that the Plague sometimes spreads from place to place very irregularly. Thuanus^k

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speaks

^k Histor. lib. lxiii.

speaks of a Plague in Italy, which one year was at Trent and Verona, the next got into Venice and Padua, leaving Vicenza, an intermediate place, untouched, though the next year that also felt the same stroke: a certain proof that the Plague was not carried by the air from Verona to Padua and Venice; for the infected air must have tainted all in its passage. We have had lately in France one instance of the same nature, when the Plague was carried at once out of Provence several leagues into the Gevaudan. Usually indeed the Plague, especially when more violent than ordinary, spreads from infected places into those which border upon them: which probably is sometimes effected by some little communication infected towns are obliged to hold with the country about them for the sake of necessaries, the subtlety of the venom now and then eluding the greatest precautions; and at other times by such as withdraw themselves from infected places into the neighbourhood.

I own it cannot be demonstrated, that when the Plague makes great ravage in any town, the number of sick shall never be great enough to load the air with infectious effluvia, emitted from them in such plenty, that they may be conveyed by the winds into a neighbouring town or village without being dispersed so much as to hinder their producing any ill effects; especially since it is not unusual for the air to be so far charged with these noxious atoms, as to leave no place within the infected town secure: inasmuch that when the distemper is at its height, all shall be indifferently infected, as well those who keep from the sick, as those who are near them; though at the beginning of a Plague to avoid all communication with the diseased, is an effectual defence. However, I do not think this is often the case: just as the smoke, with which the air of the city of London is constantly impregnated, especially in winter, is not carried many miles distant; though the quantity of it is vastly greater than the quantity of infectious effluvia, that the most mortal Plague could generate.

But,

But, to conclude what relates to the air, since the ill qualities of it in these northern countries are not alone sufficient to excite the Plague, without imported contagion, this shews the error of a common opinion, countenanced by authors of great name¹, that we are necessarily visited with the Plague once in thirty or forty years: which is a mere fancy, without foundation either in reason or experience; and therefore people ought to be delivered from such vain fears. Since the pestilence is never originally bred with us, but always brought accidentally from abroad, its coming can have no relation to any certain period of time. And although our three or four last Plagues have fallen out nearly at such intervals, yet that is much too short a compass of years to be a foundation for a general rule. Accordingly we see that almost fourscore years have passed over without any calamity of this kind.

The air of our climate is so far from being ever the original of the true Plague, that most probably it never produces those milder infectious distempers, the small-pox and measles. For these diseases were not heard of in Europe before the Moors had entered Spain: and (as I have observed in the preface) they were afterwards propagated and spread through all nations, chiefly by means of the wars with the Saracens.

Moreover, we are so far from any necessity of these periodical returns of the Plague, that, on the contrary, though we have had several strokes of this kind, yet there are instances of bad contagions from abroad being brought over to us, which have proved less malignant here, when our northern air has not been disposed to receive such impressions.

The sweating sickness, before hinted at, called *Sudor Anglicus* and *Febris Ephemera Britannica*, because it was commonly thought to have taken its rise here, was most probably of a foreign original: and though not the common Plague with glandular tumors, and carbuncles, yet a real pestilence from the same cause,

¹ Sydenham de Peste.

cause, only altered in its appearance, and abated in its violence, by the salutary influence of our climate. For it preserved an agreement with the common Plague in many of its symptoms, as excessive faintness and inquietudes, inward burnings, &c. these symptoms being no where observed in so intense a degree as here they are described to have been, except in the true Plague: and, what is much more, it was likewise a contagious disease.

The first time this was felt here, which was in the year 1485, it began in the army, with which king Henry VII. came from France and landed in Wales^m: and it has been supposed by some to have been brought from the famous siege of Rhodes by the Turks three or four years before, as may be collected from what Dr. Keyes says in one place of his treatise on this diseaseⁿ. Besides, of the several returns which this has made since that time, viz. in the years 1506, 1517, 1528, and 1551, that in the year 1528 may very justly be suspected to have been owing to the common pestilence, which at those times raged in Italy^o, as I find one of our historians has long ago conjectured^p: and the others were very probably from a Turkish infection. If at least some of these returns were not owing to the remains of former attacks, a suitable constitution of air returning to put the latent seeds in action before they were quite destroyed. It is the more probable that this disease was owing to imported contagion; because we are assured, that this form of the sickness was not peculiar to our island, but that it made great destruction with the same symptoms in Germany, and other countries^q.

I call this distemper a Plague with lessened force: because though its carrying off thousands for want of right management was a proof of its malignity, which indeed in one respect exceeded

^m Vid. Caium, De Febr. Ephemer. Britan. and Lord Bacon's History of Henry VII.

ⁿ Pag. 162. Edit. Lovan.
tagio in Firenze, & Summonte Histor. di Napoli.
of Henry VIII.

^q Thuani Histor. lib. v.

^o Vid. Rondinelli Con-

^p Lord Herbert's History

ceeded that of the common Plague itself (for few, who were destroyed with it, survived the seizure above one natural day) yet its going off safely with profuse sweats in twenty-four hours, when due care was taken to promote that evacuation, shewed it to be what a learned and wise historian calls it, rather a surprize to nature, than obstinate to remedies; who assigns this reason for expressing himself thus, that if the patient was kept warm with temperate cordials, he commonly recovered^r. And, what I think yet more remarkable, sweating, which was the natural crisis of this distemper, has been found by great physicians the best remedy against the common Plague: by which means, when timely used, that distemper may sometimes be carried off without any external tumors. Nay besides, a judicious observer informs us, that in many of his patients, when he had broken the violence of the distemper by such an artificial sweat, a natural sweat not excited by medicines would break forth exceedingly refreshing^s.

And I cannot but take notice, as a confirmation of what I have been advancing, that we had here the same kind of fever in the year 1713, about the month of September, which was called the Dunkirk fever, as being brought by our soldiers from that place. This probably had its original from the Plague, which a few years before broke out at Dantzick, and continued some time among the cities of the north. With us this fever began only with a pain in the head, and went off in large sweats usually after a day's confinement: but at Dunkirk it was attended with the additional symptoms of vomiting, diarrhœa, &c.

To return from this digression: from all that has been said, it appears, I think, very plainly, that the Plague is a real poison, which being bred in the southern parts of the world, is carried by commerce into other countries, particularly into Turkey, where it maintains itself by a kind of circulation from persons
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^r Lord Verulam's History of Henry VII.
An. 1665.

^s Vide Sydenham, De Peste,

to goods: which is chiefly owing to the negligence of the people there, who are stupidly careless in this affair. That when the constitution of the air happens to favour infection, it rages there with great violence: that at that time more especially diseased persons give it to one another, and from them contagious matter is lodged in goods of a loose and soft texture, which being packed up and carried into other countries, let out, when opened, the imprisoned seeds of contagion, and produce the disease whenever the air is disposed to give them force; otherwise they may be dissipated without any considerable ill effects. And lastly, that the air does not usually diffuse and spread these to any great distance, if intercourse and commerce with the place infected be strictly prevented.

P A R T II.

OF THE METHODS TO BE TAKEN
AGAINST THE PLAGUE.

C H A P. I.

Of preventing infection from other countries.

AS it is a satisfaction to know, that the Plague is not a native of our country, so this is likewise an encouragement to the utmost diligence in finding out means to keep ourselves clear from it.

This caution consists of two parts : The preventing its being brought into our island ; and, if such a calamity should happen, the putting a stop to its spreading among us.

The first of these is provided for by the established method of obliging ships, that come from infected places, to perform quarantine : as to which, I think it necessary, that the following rules be observed.

Near to our several ports, there should be lazaretto's built in convenient places, on little islands, if it can so be, for the reception both of men and goods, which arrive from places suspected of infection : the keeping men in quarantine on board the ship being not sufficient ; the only use of which is to observe whether any die among them. For infection may be preserved so long in clothes, in which it is once lodged, that as much, nay

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more of it, if sickness continues in the ship, may be brought on shore at the end than at the beginning of forty days: unless a new quarantaine be begun every time any person dies; which might not end but with the destruction of the whole ship's crew.

If there has been any contagious distemper in the ship; the sound men should leave their clothes, which should be sunk in the sea, the men washed and shaved, and having fresh clothes, should stay in the lazaretto thirty or forty days. The reason of this is, because persons may be recovered from a disease themselves, and yet retain matter of infection about them a considerable time: as we frequently see the small-pox taken from those, who have several days before passed through the distemper.

The sick, if there be any, should be kept in houses remote from the sound, and, some time after they are well, should also be washed and shaved, and have fresh clothes; whatever they wore while sick being sunk or buried: and then being removed to the houses of the sound, should continue there thirty or forty days.

I am particularly careful to destroy the clothes of the sick, because they harbour the very quintessence of contagion. A very ingenious author^a, in his admirable description of the Plague at Florence in the year 1348, relates what himself saw: that two hogs finding in the streets the rags, which had been thrown out from off a poor man dead of the disease, after snuffling upon them, and tearing them with their teeth, they fell into convulsions, and died in less than an hour. The learned Fracastorius acquaints us, that in his time, there being a Plague in Verona, no less than twenty-five persons were successively killed by the infection of one furr garment^b. And Forestus gives a like instance of seven children, who died by playing upon clothes brought to Alckmaer in North-Holland, from an infected house in Zealand^c. The late Mr. Williams, chaplain to Sir Robert Sutton,

^a Boccaccio Decameron. Giornat. prim.

^b De Contagione, l. iii. c. 7.

^c Observat. l. vi. Schol. ad Observ. 22.

Sutton, when embassador at Constantinople, used to relate a story of the same nature told him by a bassâ: that in an expedition this bassâ made to the frontiers of Poland, one of the janizaries under his command died of the Plague; whose jacket, a very rich one, being bought by another janizary, it was no sooner put on, but he also was taken sick and died: and the same misfortune befel five janizaries more, who afterwards wore it. This the bassâ related to Mr. Williams, chiefly for the sake of this farther circumstance, that the incidents now mentioned prevailed upon him to order the burning of the garment: designing by this instance to let Mr. Williams see there were Turks, who allowed themselves in so much freedom of thought, as not to pay that strict regard to the Mahometan doctrine of fatality, as the vulgar among them do.

If there has been no sickness in the ship, I see no reason why the men should perform quarantaine. Instead of this, they may be washed, and their clothes aired in the lazaretto, as goods, for one week.

But the greatest danger is from such goods, as are apt to retain infection, such as cotton, hemp and flax, paper or books, silk of all sorts, linen, wool, feathers, hair, and all kinds of skins. The lazaretto for these should be at a distance from that for the men; and they must in convenient warehouses be unpacked, and exposed, as much as may be, to the fresh air for forty days.

This may perhaps seem too long; but as we do not know how much time precisely is necessary to purge the interstices of spongy substances from infectious matter by fresh air, the caution cannot be too great in this point. Certainly the time here proposed, having been long established by general custom, ought not in the least to be retrenched; unless there could be a way found out of trying when bodies have ceased to emit the noxious fumes. Possibly this might be discovered by putting tender animals near to them, particularly little birds: because it has been observed in times of the Plague, that the country has been for-

taken by the birds; and those kept in houses have many of them died^a. Now if it should be found, that birds let loose among goods at the beginning of their quarantine, are obnoxious to the contagion in them, it may be known, in good measure, when such goods are become clean, by repeating the trial till birds let fly among them receive no hurt. But the use of this expedient can be known only by experience. In the mean time, I own I am fond of the thought, in compassion to poor labourers, who must expose their lives to danger, in the attendance upon this work: and though I am well aware that there are Plagues among animals, which do not indifferently affect all kinds of them, some being confined to a particular species, (like the disease of the black cattle here, a few years since, which neither proved infectious to other brutes, nor to men;) yet it has always been observed that the true Plague among men has been destructive to all creatures of what kind soever.

A very remarkable story, lately communicated to me by a person of undoubted credit, is too much to the purpose to be here omitted. The fact is this. In the year 1726, an English ship took in goods at Grand Cairo, in the time of the Plague's raging there, and carried them to Alexandria. Upon opening one of the bales of wool in a field, two Turks employed in the work were immediately killed: and some birds, which happened to fly over the place, dropped down dead.

However, the use of quarantines is not wholly frustrated by our ignorance of the exact time required for this purification: since the quarantine does at least serve as a trial whether goods are infected or not; it being hardly possible that every one of those, who are obliged to attend upon them, can escape hurt, if they are so. And whenever that happens, the goods must be destroyed.

I take it for granted, that the goods should be opened, when they are put into the lazaretto, otherwise their being there will
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^a Diemerbroeck, De Peste, l. i. c. 4.

avail nothing. This is the constant practice in the ports of Italy. That it is so at Leghorn, appears by the account lately published of the manner in which quarantaines are there performed: and I find, that the same rule is observed at Venice, from an authentic paper I have before me, containing the methods made use of in that city, where quarantaines have been enjoined ever since the year 1484; at which time, as far as I can learn, they were first instituted in Europe. In that place all bales of cotton, of camel's or of beaver's hair, and the like, are ript open from end to end, and holes made in them by the porters every day, into which they thrust their naked arms, in order that the air may have free access to every part of the goods. That some such cautions as these ought not to be omitted, is clearly proved by the misfortune, which happened in the island of Bermudas about the year 1695; where, as the account was given me by the learned Dr. Halley, a sack of cotton put on shore by stealth, lay above a month without any prejudice to the people of the house, where it was hid: but when it came to be distributed among the inhabitants, it carried such a contagion along with it, that the living scarce sufficed to bury the dead. This relation Dr. Halley received from captain Tucker of Bermudas, brother to Mr. Tucker late under-secretary in our secretary's office.

Indeed, as it has been frequently experienced, that of all the goods, which harbour infection, cotton in particular is the most dangerous, and Turkey is almost a perpetual seminary of the Plague; I cannot but think it highly reasonable, that whatever cotton is imported from that part of the world, should at all times be kept in quarantine: because it may have imbibed infection at the time of its packing up, notwithstanding no mischief has been felt from it by the ship's company. And the length of time from its being packed up to its arrival here, is no certain security that it is cleared from the infection. At least, it is found, that the time employed by ships in passing between Turkey and Marseilles, is not long enough for goods to

lose their infection : as appears not only from the late instance, but also from an observation made in a certain memorial, drawn up by the deputy of trade at Marseilles ^e. Marseilles is the only port in France allowed to receive Goods from the Levant, on account of its singular convenience for quarantaines, by reason of several small islands situate about it. The ports of France in the western ocean having had a desire to be allowed the same liberty, their deputies presented, in the year 1701, a memorial to the royal council of trade, containing several reasons for their pretensions. To this the deputy at Marseilles makes reply in the memorial I am speaking of, in which this advantage of Marseilles for quarantaines above the other ports, is much insisted upon : and, to evince the importance thereof, it is declared in express words, that many times persons have been found in that place to die of the Plague in their attendance upon goods under quarantine. Now if it be certain, that goods have retained infection during their passage from Turkey to Marseilles ; it is too hardy a presumption to be admitted in an affair so important as this, that they must necessarily lose all contagion in the time of their coming to us, because the voyage is something longer. But besides this, there are some few instances of goods, that have retained their infection many years. In particular, Alex. Benedictus gives a very distinct relation of a feather-bed, that was laid by seven years on suspicion of its being infected, which produced mischievous effects at the end of that great length of time ^f. And Sir Theodore Mayerne relates, that some clothes fouled with blood and matter from Plague sores being lodged between matting and the wall of a house in Paris, gave the Plague several years after to a workman, who took them out, which presently spread through the city ^g.

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^e Memorials presented by the deputies of the council of trade, in France, to the royal council, pag. 44 and 45. ^f Alex. Benedict. De Peste, cap. 3. ^g In a paper of advice against the Plague, laid before the king and council by Sir Theod. Mayerne, in the year 1631. MS.

What makes cotton so eminently dangerous, is its great aptitude to imbibe and retain any sort of effluvia near it ; of which I have formerly made a particular experiment, by causing some cotton to be placed for one day near a piece of putrefying flesh from an amputated limb, in a bell-glass, but without touching it : for the cotton imbibed so strong a taint, that being put up in a close box, it retained its offensive scent above ten months, and would, I believe, have kept for years. If, instead of the fumes of putrefied flesh from a sound body, this cotton had been thus impregnated with the fumes of corrupted matter from one sick of the Plague ; I make no doubt but it would have communicated infection. And the experiment would have succeeded alike in both cases, if instead of cotton, silk, wool, or hair, had been inclosed in the vessel : animal substances being the most apt to attract the volatile particles, which come from bodies of the same nature with themselves.

As all reasonable provisions should be made both for the sound and sick, who perform quarantaine ; so the strict keeping of it ought to be enforced by the severest penalties. And if a ship comes from any place, where the Plague raged, at the time of the ship's departure from it, with more than usual violence ; it will be the securest method to sink all the goods, and even the ship sometimes : especially if any on board have died of the disease.

Nor ought this further caution to be omitted, that when the contagion has ceased in any place by the approach of winter, it will not be safe to open a free trade with it too soon : because there are instances of the distemper's being stopt by the winter cold, and yet the seeds of it not destroyed, but only kept unactive, till the warmth of the following spring has given them new life and force. Thus in the great Plague at Genoa about four-score years ago, which continued part of two years ; the first summer about ten thousand died ; the winter following hardly any ; but the summer after no less than sixty thousand. Likewise the last Plague

Plague at London appeared the latter end of the year 1664, and was stopt during the winter by a hard frost of near three months continuance; so that there remained no farther appearance of it till the ensuing spring^a. Now if goods brought from such a place should retain any of the latent contagion, there will be danger of their producing the same mischief in the place to which they are brought, as they would have caused in that from whence they came.

But above all, it is necessary, that the clandestine importing of goods be punished with the utmost rigour; from which wicked practice I should always apprehend more danger of bringing the disease than by any other way whatsoever.

These are, I think, the most material points, to which regard is to be had in defending ourselves against contagion from other countries. The particular manner of putting these directions in execution, as the visiting of ships, regulation of lazaretto's, &c. I leave to proper officers, who ought sometimes to be assisted herein by able physicians.

C H A P. II.

Of stopping the progress of the Plague, if it should enter our country.

THE next consideration is, what to do in case, through a miscarriage in the publick care, by the neglect of officers, or otherwise, such a calamity should be suffered to befall us.

There is no evil in the world, in which the great rule of resisting the beginning, more properly takes place, than in the present case; and yet it has unfortunately happened, that the common steps formerly taken have had a direct tendency to hinder the putting this maxim in practice.

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^a Hodges, De Peste.

As the Plague always breaks out in some particular place, it is certain, that the directions of the civil magistrate ought to be such, as to make it as much for the interest of infected families to discover their misfortune, as it is, when a house is on fire, to call in the assistance of the neighbourhood: whereas, on the contrary, the methods taken by the publick, on such occasions, have always had the appearance of a severe discipline, and even punishment, rather than of a compassionate care; which must naturally make the infected conceal the disease as long as was possible.

The main import of the orders issued out at these times was¹; As soon as it was found, that any house was infected, to keep it shut up, with a large red cross, and these words, Lord, have mercy upon us, painted on the door; watchmen attending day and night to prevent any one's going in or out, except such physicians, surgeons, apothecaries, nurses, searchers, &c. as were allowed by authority: and this to continue at least a month after all the family was dead or recovered.

It is not easy to conceive a more dismal scene of misery than this: families locked up from all their acquaintance, though seized with a distemper which the most of any in the world requires comfort and assistance; abandoned it may be to the treatment of an inhumane nurse (for such are often found at these times about the sick;) and strangers to every thing but the melancholy sight of the progress death makes among themselves: with small hopes of life left to the survivors, and those mixed with anxiety and doubt, whether it be not better to die, than to prolong a miserable being, after the loss of their best friends and nearest relations.

If fear, despair, and all dejection of spirits, dispose the body to receive contagion, and give it a great power, where it is received,

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¹ Vid. Directions for the cure of the Plague, by the college of physicians; and orders by the lord mayor and aldermen of London, published 1665.

as all physicians agree they do ; I do not see how a disease can be more enforced than by such a treatment.

Nothing can justify such cruelty, but the plea, that it is for the good of the whole community, and prevents the spreading of infection. But this upon due consideration will be found quite otherwise : for while contagion is kept nursed up in a house, and continually increased by the daily conquests it makes, it is impossible but the air should become tainted in so eminent a degree, as to spread the infection into the neighbourhood upon the first outlet. The shutting up houses in this manner is only keeping so many seminaries of contagion, soon or later to be dispersed abroad : for the waiting a month, or longer, from the death of the last patient, will avail no more than keeping a bale of infected goods unpacked ; the poison will fly out, whenever the Pandora's box is opened.

As these measures were owing to the ignorance of the true nature of contagion, so they did, I firmly believe, contribute very much to the long continuance of the Plague, every time they have been practised in this city : and no doubt, they have had as ill effects in other countries.

It is therefore no wonder, that grievous complaints were often made against this unreasonable usage ; and that the citizens were all along under the greatest apprehensions of being thus shut up. This occasioned their concealing the disease as long as they could, which contributed very much to the enforcing and spreading of it : and when they were confined, it often happened that they broke out of their imprisonment, either by getting out at windows, &c. or by bribing the watchmen at their doors ; and sometimes even by murdering them. Hence in the nights, people were often met running about the streets, with hideous shrieks of horror and despair, quite distracted, either from the violence of the fever, or from the terrors of mind, into which they were thrown by the daily deaths they saw of their nearest relations.

In these miserable circumstances, many ran away, and when they had escaped, either went to their friends in the country, or built hutts or tents for themselves in the open fields, or got on board ships lying in the river. A few also were saved by keeping their houses close from all communication with their neighbours^k.

And it must be observed, that whenever popular clamours prevailed so far, as to procure some release for the sick, this was remarkably followed with an abatement of the disease. The Plague, in the year 1636, began with great violence; but leave being given by the king's authority for people to quit their houses, it was observed, that not one in twenty of the well persons removed fell sick, nor one in ten of the sick died^l. Which single instance alone, had there been no other, should have been of weight ever after to have determined the magistracy against too strict confinements. But besides this, a preceding Plague, viz. in the year 1625, affords us another instance of a very remarkable decrease upon the discontinuing to shut up houses. It was indeed so late in the year, before this was done, that the near approach of winter was doubtless one reason for the diminution of the disease, which followed: yet this was so very great, that it is at least past dispute, that the liberty then permitted was no impediment to it. For this opening of the houses was allowed of in the beginning of September: and whereas the last week in August, there died no less than four thousand two hundred and eighteen, the very next week the burials were diminished to three thousand three hundred and forty-four; and in no longer time than to the fourth week after, to eight hundred and fifty-two^m.

Since therefore the management in former times neither answers the purpose of discovering the beginning of the infection,

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nor

^k Vid. a Journal of the Plague in 1665, by a citizen. London, 1722.

^l Discourse upon the Air, by Tho. Cock.

soberly debated, Anno 1665.

^m Vid. The shutting up houses

nor of putting a stop to it when discovered, other measures are certainly to be taken; which, I think, should be of this nature.

There ought, in the first place, a council of health to be established, consisting of some of the principal officers of state, both ecclesiastical and civil, some of the chief magistrates of the city, two or three physicians, &c. And this council should be intrusted with such powers, as might enable them to see all their orders executed with impartial justice, and that no unnecessary hardships, under any pretence whatever, be put upon any by the officers they employ.

Instead of ignorant old women, who are generally appointed searchers in parishes to inquire what diseases people die of, that office should be committed to understanding and diligent men: whose business it should be, as soon as they find any have died after an uncommon manner, particularly with livid spots, bubo's, or carbuncles, to give notice thereof to the council of health; who should immediately send skilful physicians to examine the suspected bodies, and to visit the houses in the neighbourhood, especially of the poorer sort, among whom this evil generally begins. And if upon their report it appears, that a pestilential distemper is broken out, they should without delay order all the families, in which the sickness is, to be removed; the sick to different places from the sound: but the houses for both should be three or four miles out of town; and the sound people should be stript of all their clothes, and washed and shaved, before they go into their new lodgings. These removals ought to be made in the night, when the streets are clear of people: which will prevent all danger of spreading the infection. And besides, all possible care should be taken to provide such means of conveyance for the sick, that they may receive no injury.

As this management is necessary with respect to the poor and meaner sort of people; so the rich, who have conveniences, may, instead of being carried to lazaretto's, be obliged to go to their country-houses: provided that care be always taken to keep the sound

found separated from the infected. And at the same time all the inhabitants who are yet well, should be permitted, nay encouraged to leave the town, which, the thinner it is, will be the more healthy.

No manner of compassion and care should be wanting to the diseased; to whom, when lodged in clean and airy habitations, there would, with due cautions, be no great danger in giving attendance. All expences should be paid by the publick, and no charges ought to be thought great, which are counterbalanced with the saving a nation from the greatest of calamities. Nor does it seem to me at all unreasonable, that a reward should be given to the person, that makes the first discovery of infection in any place: since it is undeniable, that the making known the evil to those, who are provided with proper methods against it, is the first and main step towards the overcoming it.

Although the methods taken in other countries, as well as in our own, have generally been different from what we have here recommended; yet there are not wanting some instances of extraordinary success attending these measures, whenever they have happened to be put in practice.

The magistrates of the city of Ferrara in Italy in the year 1630, when all the country round about them was infected with the Plague, observing the ill success of the conduct of their neighbours, who, for fear of losing their commerce, did all they could to conceal the disease, by keeping the sick in their houses, resolved, whenever occasion should require, to take a different method. Accordingly, as soon as they received information, that one had died in their city of the pestilence, they immediately removed the whole family he belonged to into a lazaretto, where all, being seven in number, likewise died. But though the disease was thus malignant, it went no farther, being suppressed at once by this method. Within the space of a year the same case returned seven or eight times, and this management as often put a stop to it. The example of this city was afterwards

afterwards followed more than once by some other towns in the same territory with so good success, that it was thought expedient, for the common good, to publish in the Memoirs of the people of Ferrara, this declaration : That the only remedy against the Plague is to make the most early discovery of it, that is possible, and thus to extinguish it in the very beginning ⁿ.

No less remarkable than this occurrence at Ferrara, is what happened at Rome in the Plague, I have taken notice of before, in the year 1657. When the disease had spread itself among both rich and poor, and raged in the most violent manner ; the pope appointed cardinal Gastaldi, to be commissary-general of health, giving him for a time the power of the whole sacred college, with full commission to do whatever he should judge necessary. Hereupon he gave strict orders, that no sick or suspected persons should stay in their own houses. The sick he removed, upon the first notice, to a lazaretto in the island of the Tyber ; and all who were in the same houses with them to other hospitals just without the city, in order to be sent to the island, if they should fall sick. At the same time he took diligent care to send away their goods to an airy place to be cleansed. He executed these regulations with so much strictness, that no persons of the highest quality were exempted from this treatment ; which occasioned at first great complaints against the cardinal for his severity ; but soon after he had general thanks : for in two months time, by this means, he entirely cleared the city of the pestilence, which had continued in it almost two years. And it was particularly observed, that whereas before, when once the disease had got into a house, it seldom ended without seizing the whole family ; in this management scarce five out of an hundred of the sound persons removed were infected ^o.

I cannot but take notice, that the Plague was stopped at Marseilles a full fortnight by the same measures, and probably might have
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ⁿ Muratori governo della Peste, lib. i. c. 5.
avertendâ Peste, c. 10.

^o Cardin. Gastaldi, De

been wholly extinguished, had not new force been given it by the unseasonable confidence of the inhabitants upon this intermission: which, we are informed, was so great, that they would not believe the pestilence had been at all among them, and publickly upbraided the physicians and surgeons for frightening them causlessly^p. At this time, no doubt, they must have neglected the cautions necessary for their security so much, as to leave us no room to be surprized, that the disease should after this break out again with too great violence to be a second time overcome.

But, besides these examples in foreign countries, we have one instance of the same nature nearer home. When the Plague was last here in England, upon its first entrance into Poole in Dorsetshire, the magistrates immediately suppressed it, by removing the sick into pest-houses, without the town, as is well remembered there to this time. A very remarkable occurrence has greatly contributed towards preserving all the circumstances of this transaction in memory. They found some difficulty in procuring any one to attend upon the sick after their removal: which obliged the town to engage a young woman, then under sentence of death, in that service, on a promise to use their interest for obtaining her pardon. The young woman escaped the disease, but neglecting to solicit the corporation for the accomplishment of their engagement with her, three or four months after she was barbarously hanged by the mayor upon a quarrel between them.

I would have it here observed, that as the advice I have been giving is founded upon this principle, that the best method for stopping infection, is to separate the healthy from the diseased; so in small towns and villages, where it is practicable, if the sound remove themselves into barracks, or the like airy habitations, it may probably be even more useful, than to remove the sick. This method has been found beneficial in France after all others have failed. But the success of this proves the method of removing

^p Journal de ce qui s'est passé à Marseilles, &c. p. 9, 10, 11.

moving the sick, where this other cannot be practised, to be the most proper of any.

When the sick families are gone, all the goods of the houses, in which they were, should be buried deep under ground. This I prefer to burning them: because, especially in a close place, some infectious particles may possibly be dispersed by the smoke through the neighbourhood; according to what Mercurialis relates, that the Plague in Venice was augmented by burning a large quantity of infected goods in the city⁹. A learned physician of my acquaintance lately communicated to me the relation of a case, (given to him by an apothecary, who was at the place when the thing happened) very proper to be here mentioned. The story is this. At Shipston, a little town upon the river Stour in Worcestershire, a poor vagabond was seen walking in the streets with the small-pox upon him. The people frightened took care to have him carried to a little house, seated upon a hill, at some distance from the town, providing him with necessaries. In a few days the man died. They ordered him to be buried deep in the ground, and the house with his clothes to be burnt. The wind being pretty high, blew the smoke upon the houses on one side of the town: in that part, a few days after, eight persons were seized with the small-pox. So dangerous is heat in all kinds of pestilential distempers, and so diffusive of contagion. And moreover the houses themselves may likewise be demolished or pulled down, if that can conveniently be done; that is, if they are remote enough from others: otherwise it may suffice to have them thoroughly cleansed, and then plastered up. And after this, all possible care ought still to be taken to remove whatever causes are found to breed and promote contagion. In order to this, the overseers of the poor (who might be assisted herein by other officers) should visit the dwellings of all the meaner sort of the inhabitants; and where they find them stifled up too close and nasty, should lessen their
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⁹ De Pestilent. cap. 21.

number by sending some into better lodgings, and should take care, by all manner of provision and encouragement, to make them more cleanly and sweet.

No good work carries its own reward with it so much as this kind of charity : and therefore, be the expence what it will, it must never be thought unreasonable. For nothing approaches so near to the first original of the Plague, as air pent up, loaded with damps, and corrupted with the filthiness, that proceeds from animal bodies.

Our common prisons afford us an instance of something like this, where very few escape what they call the jail fever, which is always attended with a degree of malignity in proportion to the closeness and stench of the place : and it would certainly very well become the wisdom of the government, as well with regard to the health of the town, as in compassion to the prisoners, to take care, that all houses of confinement should be kept as airy and clean, as is consistent with the use, to which they are designed.

The black affize at Oxford, held in the castle there in the year 1577, will never be forgot^r ; at which the judges, gentry, and almost all that were present, to the number of three hundred, were killed by a poisonous steam, thought by some to have broken forth from the earth ; but by a noble and great philosopher^s more justly supposed to have been brought by the prisoners out of the jail into court ; it being observed, that they alone were not injured by it.

At the same time that this care is taken of houses, the proper officers should be strictly charged to see that the streets be washed and kept clean from filth, carrion, and all manner of nuisances ; which should be carried away in the night time : nor should the laystalls be suffered to be too near the city. Beggars and idle persons should be taken up, and such miserable objects, as are

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^r Camden. Annal. Regin. Elizab.
Cent. 10. Num. 194.

^s Lord Verulam, Natural History,

neither fit for the common hospitals, nor work-houses, should be provided for in an hospital of incurables.

Orders indeed of this kind are necessary to be observed at all times, especially in populous cities; and therefore I am sorry to take notice, that in these of London and Westminster there is no good police established in these respects: for want of which the citizens and gentry are every day annoyed more ways than one.

If these early precautions, we have mentioned, prove successful, there will be no need of any methods for correcting the air, purifying houses, or of rules for preserving particular persons from infection: to all which, if the Plague get head, so that the sick are too many to be removed (as they will be when the disease has raged for a considerable time) regard must be had.

As to the first: fire has been almost universally recommended for this purpose, both by the antients and moderns; who have advised to make frequent and numerous fires in the towns infected. This precept, I think, is almost entirely founded upon a tradition, that Hippocrates put a stop to a Plague in Greece by this means. But it is to be observed, that there is no mention made of any thing like it in the works of Hippocrates. The best authority we have for it, is the testimony of Galen, though it is also mentioned by other authors. Galen, recommending *Theriaca* against the pestilence, has thought fit, it seems, to compare it to fire; and, upon this conceit, relates, that Hippocrates cured a Plague, which came from *Æthiopia* into Greece, by purifying the air with fires; into which were thrown sweet-scented herbs and flowers, together with ointments of the finest flavour. It is remarkable, that among the epistles ascribed to Hippocrates, which, though not genuine, yet are older than Galen, there is a decree said to be made by the Athenians in honour of this father of physicians, which, making mention of the service he had done his country in a Plague, says only, that he sent his scholars into several parts, with proper instructions to cure the disease. By
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which it should seem, that this story of the fires was hardly or not at all known at the time when these letters were compiled. And Soranus may yet more confirm us, that it was framed long after the death of Hippocrates : for Soranus only says in general, that Hippocrates foretold the coming of the pestilence, and took care of the cities of Greece ; without any mention of having used this particular expedient. Plutarch indeed speaks of a practice like this as commonly approved among physicians, which he makes use of to illustrate a certain custom of the Egyptians : of whom he says, that they purify the air by the fumes of resin and myrrh, as physicians correct the foulness, and attenuate the thickness thereof in times of pestilence, by burning sweet-woods, juniper, cypress¹.

This I take to be the sum of what can be learned from antiquity in relation to this point ; from whence we may see, that writers have concluded a little too hastily for the use of common fires in this case, upon the authority and example of Hippocrates, though we should allow the fact as related by Galen : when it will not from thence appear that Hippocrates himself relied upon them ; since he thought it necessary to take in the assistance of aromatick fumes. But as this fact is not grounded upon sufficient authority, so it is needless to insist long upon it. The passage I have brought from Plutarch will better explain what was the sentiment of those physicians who approved the practice. It seems they expected from thence to dispel the thickness and foulness of the air. And no doubt but such evil dispositions of the air, as proceed from damps, exhalations, and the like, may be corrected even by common fires, and the predisposition of it from these causes to receive infection sometimes removed. But I think this method, if it be necessary, should be put in practice before the coming of the pestilence. For when the distemper is actually begun, and rages, since it is known to be spread and in-

¹ Plutarch, lib. de Isid. & Osir.

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creased by the heat of the summer, and on the contrary checked by the cold in winter; undoubtedly, whatever increases that heat, will so far add force to the disease: as Mercurialis takes notice, that smiths, and all those who worked at the fire were most severely used in the Plague at Venice in his time^u. Whether the service fires may do by correcting any other ill qualities of the air, will counterbalance the inconvenience upon this account, experience only can determine: and the fatal success of the trials made here in the last Plague, is more than sufficient to discourage any farther attempts of this nature. For fires being ordered in all the streets for three days together, there died in one night following no less than four thousand (if we may believe Dr. Hodges :) whereas in any single week before or after, never twice that number were carried off^x. And we find that upon making the same experiment in the last Plague at Marseilles, the contagion was every day spread more and more through the city with increased rage and violence^y.

What has been said of fires, is likewise to be understood of firing of guns, which some have too rashly advised. The proper correction of the air would be to make it fresh and cool: accordingly the Arabians^z, who were best acquainted with the nature of pestilences, advise people to keep themselves as airy as possible, and to chuse dwellings exposed to the wind, situate high, and refreshed with running waters.

As for houses, the first care ought to be to keep them clean: for as nastiness is a great source of infection, so cleanliness is the greatest preservative; which shews us the true reason, why the poor are most obnoxious to contagious diseases. It is remarked of the Persians, that though their country is surrounded every year with the Plague, they seldom or never suffer any thing by it

^u De Peste, c. 22. ^x Hodges, De Peste, p. 24. ^y Journal de la Peste de Marseilles, p. 19, & Relation Historique de tout ce qui s'est passé à Marseilles pendant la dernière Peste, pag. 77. ^z Rhazes, De re Medica, lib. iv. c. 24, & Avicenn. Can. Med. lib. iv. c. 1.

it themselves : and it is likewise known, that they are the most cleanly people of any in the world, and that many among them make it a great part of their religion to remove filthiness and nuisances of every kind from all places about their cities and dwellings ^a.

Besides this, the Arabians advise the keeping houses cool, as another method of purification, and therefore, to answer this end more fully, they directed to strew them with cooling herbs, as roses, violets, water-lilies, &c. and to be washed with water and vinegar : than all which, especially the last, nothing more proper can be proposed. I think it not improper likewise to fume houses with vinegar, either alone or together with nitre, by throwing it upon a hot iron or tile ; though this be directly contrary to what modern authors mostly advise, which is to make fumes with hot things, as benzoin, frankincense, storax, &c. from which I see no reason to expect any virtue to destroy the matter of infection, or to keep particular places from a disposition to receive it ; which are the only things here to be aimed at. The smoke of sulphur, perhaps, as it abounds with an acid spirit, which is found by experience to be very penetrating, and to have a great power to repress fermentations, may promise some service this way.

As hot fumes appear to be generally useless, so the steams of poisonous minerals ought to be reckoned dangerous : and therefore I cannot but dissuade the use of all fumigations with mercury or arsenick. Much less would I advise, as some have done, the wearing arsenick upon the pit of the stomach as an amulet : since this practice has been often attended with very ill consequences, and is not grounded upon any good authority, but probably derived from an error in mistaking the Arabian word *darfini*, which signifies cinnamon, for the Latin *de arsenico*, as I have formerly shewn ^b.

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^a Gaudereau Relation des Especes de la Peste que reconnoissent les Orientaux.

^b Mech. Account of Poisons, Essay III.

The next thing after the purifying of houses, is to consider by what means particular persons may best defend themselves against contagion: for the certain doing of which, it would be necessary to put the humours of the body into such a state, as not to be alterable by the matter of infection. But since this is no more to be hoped for, than a specifick preservative from the small-pox; the most that can be done, will be to keep the body in such order, that it may suffer as little as possible. The first step towards which, is to maintain a good state of health, in which we are always least liable to suffer by any external injuries; and not to weaken the body by evacuations. The next is, to guard against all dejection of spirits, and immoderate passions: for these we daily observe do expose persons to the more common contagion of the small-pox. These ends will be best answered by living with temperance upon a good generous diet, and by avoiding fastings, watchings, extreme weariness, &c. Another defence is, to use whatever means are proper to keep the blood from inflaming. This, if it does not secure from contracting infection, will at least make the effects of it less violent. The most proper means for this, according to the advice of the Arabian physicians, is the repeated use of acid fruits, as pomegranates, sevil oranges, lemons, tart apples, &c. But above all, of wine vinegar in small quantities, rendered grateful to the stomach by the infusion of some such ingredients as gentian root, galangal, zedoary, juniper berries, &c. Which medicines by correcting the vinegar, and taking off some ill effects it might otherwise have upon the stomach, will be of good use: but these, and all other hot aromack drugs, though much recommended by authors, if used alone, are most likely to do hurt by over-heating the blood.

I cannot but recommend likewise the use of issues. The properest place for them I take to be the inside of the thigh a little above the knee. Besides, the smoking tobacco, much applauded
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by some, since it may be put in practice without any great inconvenience, need not, I think, be neglected.

But since none of these methods promise any certain protection; as leaving the place infected is the surest preservative, so the next to it is to avoid, as much as may be, the near approach to the sick, or to such as have but lately recovered. For the greater security herein, it will be adviseable to avoid all crouds of people. Nay, it should be the care of the magistrate to prohibit all unnecessary assemblies; and likewise to oblige all, who get over the disease, to confine themselves for some time, before they appear abroad.

The advice to keep at a distance from the sick, is also to be understood of the dead bodies; which should be buried at as great a distance from dwelling-houses, as may be; put deep in the earth; and covered with the exactest care; but not with quick-lime thrown in with them, as has been the manner abroad: for I cannot but think that this, by fermenting with the putrefying humours of the carcases, may give rise to noxious exhalations from the ground. They should likewise be carried out in the night, while they are yet fresh and free from putrefaction: because a carcase not yet beginning to corrupt, if kept from the heat of the day, hardly emits any kind of steam or vapour.

As for those, who must of necessity attend the sick; some farther directions should be added for their use. These may be comprehended in two short precepts. One is, not to swallow their spittle while they are about the sick, but rather to spit it out: the other, not so much as to draw in their breath, when they are very near them. The reason for both these appears from what has been said above concerning the manner, in which a sound person receives the infection. But in case it be too difficult constantly to comply with these cautions, washing the mouth frequently with vinegar, and holding to the nostrils a sponge wet with the same, may in some measure supply their place.

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This is the sum of what I think most likely to stop the progress of the disease in any place, where it shall have got admittance. If some few of these rules refer more particularly to the city of London, with small alteration they may be applied to any other place. It now remains therefore only to lay down some directions to hinder the distemper's spreading from town to town. The best method for which, where it can be done, (for this is not practicable in very great cities) is to cast up a line about the town infected, at a convenient distance; and by placing a guard, to hinder people's passing from it without due regulation, to other towns: but not absolutely to forbid any to withdraw themselves, as was done in France, according to the usual practice abroad; which is an unnecessary severity, not to call it a cruelty. I think it will be enough, if all, who desire to pass the line, be permitted to do it, upon condition they first perform quarantaine for about twenty days in tents, or other more convenient habitations. But the greatest care must be taken, that none pass without conforming themselves to this order: both by keeping diligent watch, and by punishing, with the utmost severity, any that shall either have done so, or attempt it. And the better to discover such, it will be requisite to oblige all, who travel in any part of the country, under the same penalties, to carry with them certificates either of their coming from places not infected, or of their passing the line by permission.

This I take to be a more effectual method to keep the infection from spreading, than the absolute refusing a passage to people upon any terms. For when men are in such imminent danger of their lives where they are, many, no doubt, if not otherwise allowed to escape, will use endeavours to do it secretly, let the hazard be ever so great. And it can hardly be, but some will succeed in their attempts; as we see it has often happened in France, notwithstanding all their care. But one that gets off thus clandestinely, will be more likely to carry the distemper with him, than twenty, nay, a hundred, that go away under the
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the preceding restrictions : especially because the infection of the place, he flies from, will by this management be rendered much more intense. For confining people, and shutting them up together in great numbers, will make the distemper rage with augmented force, even to the increasing it beyond what can be easily imagined : as appears from the account which the learned Gassendus^c has given us of a memorable Plague, which happened at Digne in Provence, where he lived, in the year 1629. This was so terrible, that in one summer, out of ten thousand inhabitants, it left but fifteen hundred, and of them all but five or six had gone through the disease. And he assigns this, as the principal cause of the great destruction, that the citizens were too closely confined, and not suffered so much as to go to their country-houses. Whereas in another pestilence, which broke out in the same place a year and an half after, more liberty being allowed, there did not die above one hundred persons.

For these reasons, I think, to allow people with proper cautions to remove from an infected place, is the best means to suppress the contagion, as well as the most humane treatment of the present sufferers : and, under these limitations, the method of investing towns infected, which is certainly the most proper, that can be advised, to keep the disease from spreading, will be no inconvenience to the places surrounded. On the contrary, it will rather be useful to them ; since the guard may establish such regulations for the safety of those, who shall bring provisions, as shall remove the fears, which might otherwise discourage them.

The securing against all apprehensions of this kind, is of so great importance, that in cities too large to be invested, as, for example, this city of London, the magistrates must use all possible diligence to supply this defect, not only by setting up barriers without their city, but by making it in the most particular manner their care to appoint such orders to be observed at them, as they shall judge will be most satisfactory to the country about.

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Though liberty ought to be given to the people, yet no sort of goods must by any means be suffered to be carried over the line, which are made of materials retentive of infection. For in the present case, when infection has seized any part of a country, much greater care ought to be taken, that no seeds of the contagion be conveyed about, than when the distemper is at a great distance : because a bale of goods, which shall have imbibed the contagious aura when packed up in Turkey, or any remote parts, when unpacked here, may chance to meet with so healthful a temperament of our air, that it shall do much hurt. But when the air of any one of our towns shall be so corrupted, as to maintain and spread the pestilence in it, there will be little reason to believe, that the air of the rest of the country is in a much better state.

For the same reason quarantaines should more strictly be enjoined, when the Plague is in a bordering kingdom, than when it is more remote.

The advice here given with respect to goods, is not only abundantly confirmed from the proofs I have given above, that goods a power of spreading contagion to distant places ; but might be farther illustrated by many instances of ill effects from the neglect of this caution in times of the Plague. I shall mention two, which happened among us during the last Plague. I have have had occasion already to observe, that the Plague was in Poole. It was carried to that place by some goods contained in a pedlar's pack. The Plague was likewise at Eham in the Peak of Derbyshire, being brought thither by means of a box sent from London to a taylor in that village, containing some materials relating to his trade. There being several incidents in this latter instance, that will not only serve to establish in particular the precepts I have been giving, in relation to goods, but likewise all the rest of the directions, that have been set down, for stopping the progress of the Plague from one town to another ; I shall finish this chapter with a particular relation of what passed

in that place. A servant, who first opened the foresaid box, complaining that the goods were damp, was ordered to dry them at the fire; but in doing it was seized with the Plague, and died: the same misfortune extended itself to all the rest of the family, except the taylor's wife, who alone survived. From hence the distemper spread about and destroyed in that village, and the rest of the parish, though a small one, between two and three hundred persons. But notwithstanding this so great violence of the disease, it was restrained from reaching beyond that parish by the care of the rector; from whose son, and another worthy gentleman, I have the relation. This clergyman advised, that the sick should be removed into hutts or barracks built upon the common; and procuring by the interest of the then earl of Devonshire, that the people should be well furnished with provisions, he took effectual care, that no one should go out of the parish: and by this means he protected his neighbours from infection with compleat success.

I have now gone through the chief branches of preservation against the Plague, and shall conclude with some general directions concerning the cure.

C H A P. III.

Of the cure of the Plague.

IT appears, from what has been said in the beginning of this discourse, that the Plague and the small-pox are diseases, which bear a great similitude to each other: both being contagious fevers from Africa, and both attended with certain eruptions. And as the eruptions or pustules in the small-pox are of two kinds, which has caused the distemper to be divided into two species, the distinct and confluent; so we have shewn two

sorts of eruptions or tumors likewise to attend the Plague. In the first and mildest kind of the small-pox the pustules rise high above the surface of the skin, and contain a digested pus: but in the other, the pustules lie flat, and are filled with an indigested sanies. The two kinds of critical tumors in the Plague are yet more different. In the most favourable case the morbid matter is thrown upon some of the softest glands near the surface of the body, as upon the inguinal axillary, parotid, or maxillary glands: the first appearance of which is a small induration, great heat, redness, and sharp pain near those glands. These tumors, if the patient recover, like the pustules of the distinct small-pox, come to a just suppuration, and thereby discharge the disease. In worse cases of the distemper, either instead of these tumors, or together with them, carbuncles are raised. The first appearance of them is a very small indurated tumor, not situate near any of the fore-mentioned glands, with a dusky redness, violent heat, vast pain, and a blackish spot in the middle of the tumor. This spot is the beginning of a gangrene, which spreads itself more and more as the tumor increases.

But, besides the agreement in these critical discharges, the two distempers have yet a more manifest likeness in those livid and black spots, which are frequent in the Plague, and the signs of speedy death: for the same are sometimes found to attend the small-pox with as fatal a consequence; nay, I have seen cases, when almost every pustule has taken this appearance. Moreover, in both diseases, when eminently malignant, blood is sometimes voided by the mouth, by urine, or the like^f. And we may farther add, that in both death is usually caused by mortifications in the viscera. This has constantly been found in the Plague by the physicians in France: and I am convinced, from accounts I have by me, of the dissection of a great many, who had died of the small-pox, that it is the same in that distemper.

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^f Vid, Observ. & Reflex. sur la Peste de Marseilles, p. 333.

This analogy between the two diseases, not only shews us, that we cannot expect to cure the Plague any more than the small-pox, by antidotes and specifick medicines; but will likewise direct us in the cure of the distemper, with which we are less acquainted, by the methods found useful in the other disease, which is more familiar to us.

In short, as in the small-pox, the chief part of the management consists in clearing the *primæ viæ* in the beginning; in regulating the fever; and in promoting the natural discharges: so in the Plague the same indications will have place. The great difference lies in this, that in the Plague the fever is often much more acute than in the other distemper; the stomach and bowels are sometimes inflamed; and the eruptions require external applications, which to the pustules of the small-pox are not necessary.

When the fever is very acute, a cool regimen, commonly so beneficial in the small-pox, is here still more necessary. But whenever the pulse is languid, and the heat not excessive, moderate cordials must be used.

The disposition of the stomach and bowels to be inflamed, makes vomiting not so generally safe in the Plague as in the small-pox. The most gentle emeticks ought to be used, none better than *ipecacuanha*; and great caution must be had, that the stomach or bowels are not inflamed, when they are administered: for if they are, nothing but certain death can be expected from them: otherwise at the beginning they will be always useful. Therefore upon the first illness of the patient it must carefully be considered, whether there appear any symptoms of an inflammation having seized these parts: if there are any marks of this, all vomits must be omitted; if not, the stomach ought to be gently moved.

The eruptions, whether glandular tumors, or carbuncles, must not be left to the course of nature, as is done in the small-pox; but all diligence must be used, by external applications, to
bring

bring them to suppurate. Both these tumors are to be treated in most respects alike. As soon as either of them appears, fix a cupping-glass to it without scarifying; and when that is removed, apply a suppurative cataplasin, or plaster of warm gums.

If the tumors do not come to suppuration, which the carbuncle seldom or never does; but if a thin ichor or matter exudes through the pores; or if the tumor feel soft to the touch; or lastly, if it has a black crust upon it, then it must be opened by incision, either according to the length of the tumor, or by a crucial section. And if there is any part mortified, as is usually in the carbuncle, it must be scarified. This being done, it will be necessary to stop the bleeding, and dry up the moisture with an actual cautery, dressing the wound afterwards with doffils, and pledgits spread with the common digestive made with terebinth. cum vitel. ov. and dipped in a mixture of two parts of warmed oil of turpentine, and one part of sp. sal. ammon. or in bals. te. rebinth. and over all must be put a cataplasin of theriac. lond.

The next day the wound ought to be well bathed with a fomentation made of warm aromack plants with spirit of wine in it; in order, if possible, to make the wound digest, by which the sloughs will separate. After this the ulcer may be treated as one from an ordinary abscess.

Farther, in the glandular tumors, when they suppurate, we ought not to wait, till the matter has made its way to the outer skin, but to open it as soon as it is risen to any bigness: because these tumors begin deep in the gland, and often mortify, before the suppuration has reached the skin, as the physicians in France have found upon dissecting many bodies.

This is the method in which the Plague must be treated in following the natural course of the distemper. But the patient in most cases runs so great hazard in this way, notwithstanding the utmost care, that it would be of the greatest service to mankind under this calamity, if some artificial discharge for the cor-

rupted humours could be found out, not liable to so great hazard, as the natural way. To this purpose large bleeding and profuse sweating are recommended to us upon some experience.

Dr. Sydenham tried both these evacuations with good success, and has made two very judicious remarks upon them. The first is, that they ought not to be attempted unless in the beginning of the sickness, before the natural course of the distemper has long taken place : because otherwise we can only expect to put all into confusion without any advantage. His other observation is, that we cannot expect any prosperous event from either of these evacuations, unless they are very copious : there being no prospect of surmounting so violent a malignity without bolder methods than must be taken in ordinary cases.

As for bleeding, by some accounts from France, I have been informed, that some of the physicians there have carried this practice so far, as upon the first day of the distemper to begin with bleeding about twelve ounces, and then to take away four or five ounces every two hours after. They pretend to extraordinary success from this method, with the assistance only of cooling ptisanes, and such like drinks, which they have plentifully at the same time. Such profuse bleeding as this may perhaps not suit with our constitutions so well as with theirs ; for in common cases they use this practice much more freely than we : yet we must draw blood with a more liberal hand than in any other case, if we expect success from it. I shall excuse myself from defining exactly how large a quantity of blood is requisite to be drawn, for want of particular experience : but I think fit to give this admonition, that, in so desperate a case as this, it is more prudent to run some hazard of exceeding, than to let the patient perish for want of due evacuation.

As for sweating, which is the other method proposed, it ought, no doubt, to be continued without intermission full twenty-four hours, as Dr. Sydenham advises. He is so particular in his directions about it, that I need say little. I shall only add, that
theriaca,

theriaca, and the like solid medicines, being offensive to the stomach, are not the most proper sudorificks. I should rather commend an infusion in boiling water of Virginia snake-root, or, in want of this, of some other warm aromatick, with the addition of about a fourth part of aqua theriacalis, and a proper quantity of syrup of lemons to sweeten it. From which, in illnesses of the same kind with the jail fever, which approaches the nearest to the pestilence, I have seen very good effects.

Whether either of these methods, of bleeding, or of sweating, will answer the purpose intended by them, must be left to a larger experience to determine; and the trial ought by no means to be neglected, especially in those cases, which promise but little success from the natural course of the disease.

A
DISCOURSE
ON THE
SMALL-POX
AND
MEASLES.

P R E F A C E.

A CONSIDERABLE part of this discourse was written by me many years since ; and the whole had been finished and given to the publick long ago, would the business of my profession, in which I have been constantly engaged, have allowed me time to do it. However, I flatter myself, that this intermission of the work will in the main turn to the advantage of the reader : because whatever inconveniencies may attend age, they are for the most part amply compensated by daily acquisitions of knowledge and experience. Wherefore, without farther apology, I shall now briefly lay down the motives, which first induced me to write on this subject.

In the year 1717 the learned Dr. Freind published the first and third books of Hippocrates's Epidemics, illustrated with nine commentaries concerning fevers. Of these the seventh treats of purging in the putrid fever, which follows upon the confluent Small-Pox ; and in support of his opinion, he has annexed to it the letters of four physicians to himself on that subject ; one of which is mine. For after having been several years one of the physicians to St. Thomas's hospital, in the year 1708, I observed, that some of my patients recovered from a very malignant sort of Small-Pox, even

beyond expectation, by a looseness seizing them on the ninth or tenth day of the disease, and sometimes earlier. Hence I took the hint, to try what good might be done by opening the body with a gentle purge on the decline of the distemper, especially where the patient had constantly been costive from the beginning; which is far from being an uncommon case. The success was in a great measure answerable to my wishes: for by this method I recovered many, who were in the most imminent danger.

At that time, and indeed during the remainder of his life, I was strictly joined in friendship with Dr. Freind; and as we frequently conversed on the business of our profession, I explained this point of practice to him, and met with his approbation. Soon after this, he was called to a consultation with two other eminent physicians, on the case of a young nobleman, who lay dangerously ill of the Small-Pox: whereupon, he proposed my method. But they obstinately opposed it until the fourteenth day from the eruption, when the case appearing quite desperate by convulsions with a lethargy coming on apace, they consented to give him a gentle laxative draught; which had a very good effect. Hereupon Dr. Freind gave his opinion to repeat it; but that was over-ruled, and the patient died the seventh day after. The doctor himself has given an ample account of this case^a.

This affair soon made so great a noise, that even the gentlemen of the faculty were divided upon it; some commend-

^a Freindi Opera, p. 263.

commending, others finding fault with Dr. Freind's advice: which so essentially affected his reputation, that he thought himself under a necessity of vindicating it: and therefore he entreated me to send him the purport of our former conversation in writing. Such was our friendship, that I soon complied with his request; and he shewed my letter to Dr. Radcliffe, (who at that time was very deservedly at the head of his profession, upon account of his great medical penetration and experience, and had honoured me with a considerable share of intimacy) and told him withal, that he intended to publish his defence. Whereupon Dr. Radcliffe obtained leave of me for Dr. Freind to annex my letter to his book. But after two or three sheets had been printed off, he was prevailed on by some friends to drop his undertaking; and thus both his work and my letter lay by for some years, that is, until he published his commentaries on fevers. While he was employed in this work, he had fresh thoughts of printing the aforesaid letter with it; for which purpose I revised and enlarged the letter, translated it from the original English into Latin, and, in short, new-modelled it into the form in which it appears in that book.

It very rarely happens, that a new method of cure in any disease gives universal satisfaction: however, not only Dr. Freind and myself invariably persisted in this from the first time I mentioned it to him; but several physicians likewise, both in town and country, to whom we imparted it, found its salutary effects. But there never are wanting some men of so invidious a

turn of mind, that their principal pleasure consists in blackening the reputation, and decrying the productions of others ; as if what they strip their neighbours of, was to be added to their own characters. Thus Dr. Freind's book had no sooner appeared in publick, but some of this stamp flew to arms, as if to save the commonwealth. In front of this band stood forth Dr. John Woodward, physick-professor at Gresham-College, a man equally ill-bred, vain, and ill-natured, who, after being for some time apprentice to a linen-draper, took it into his head to make a collection of shells and fossils, in order to pass upon the world for a philosopher ; thence having got admission into a physician's family, at length, by dint of interest, obtained a doctor's degree. This man published a book, intitled, *The state of physick and diseases*^b, wherein he took great liberties with Dr. Freind, and those in the same sentiment with him, but pointed his arrows most particularly at me ; and these were neither arguments nor experiments, of which he had none, but bare-faced calumny and raillery, which he poured forth in abundance. It is much against my will, that I thus revive the remembrance of that libel, which already is well nigh sunk into oblivion ; and for which the author has been justly exposed by Dr. Freind : nor should I have wasted paper on this insignificant story, had not the arrogance and vanity of the man extorted it from me. And in fine, if I have dwelt longer on this whole affair than might be expected, my motives were, first, to explain who was the author of this

^b London, 1718. 8vo.

this method of practice, and then, how little foundation Dr. Woodward had for his personal reflections and brawling.

Now, as to what concerns this discourse, I must inform the publick, that I have preferred perspicuity to flowers of language, by delivering every precept in as few words as to me seemed consistent with a clear conveyance of my notions : and I have added some particular rules and cautions relating to catharticks, for the sake of young physicians chiefly ; who are often disposed too rashly to attempt, and too eagerly to embrace every novelty in practice, especially, when handed down to them from persons, of whom they have a high opinion. For nothing can be so universally useful, as not to be liable to some exception ; and it is sometimes as great a mark of sound judgment, not to do mischief, as to do good ^c. Wherefore, not only in this case, but in all others within the compass of our art, the physician ought constantly to remember that of the poet ^d,

Nothing does good, but what may also hurt.

When I had finished this small work, I thought it might be no less agreeable than useful to the gentlemen of the faculty, if to it I annexed Rhazes's treatise of the small-pox and measles, faithfully translated from the original Arabic into Latin : as it contains an ample detail of many things relating to the nature and cure of these diseases, which, making proper allowances

for

^c Hippocrates in his first book of epidemics, lib. ii. ver. 266,

^d Ovid. Trist.,

for time and place, coincide pretty much with the doctrines I have laid down. And indeed, it has given me no small pleasure, to see my sentiments confirmed by the greatest physician of the age he lived in. But I have often wondered how it came to pass, that this book had never before been published either in Arabic, or in Latin from the Arabic. Robert Stephens was the first who published it in Greek, at the end of his edition of Alexander Trallian's work in the year 1548^e. The Greek copy has been translated into Latin by three several persons; the first of whom was Georgius Valla of Placentia, whose version was published at Venice, A.D. 1498. and went through several editions. This was followed by a second, done by Johannes Guinterius of Andernac, printed at Straßbourg in 1549: and Nicolaus Macchellus, a physician of Modena, put forth a third, printed at Venice in 1555, and again, in 1586^f. Now the Greek copy was not translated directly from the Arabic, but from a Syriac version, which latter seems to have been done for the use of the common people; and upon comparing the Greek with this Latin translation from the Arabic, which I now publish, it will appear very inaccurate, by the entire omission of some things, and faulty rendering of others; whether through the insufficiency, or negligence of the Syriac or Greek translator, I shall not determine. But the manner how I acquired my copy is this.

After

^e The Greek title is, *Παλὴν λόγος περὶ λοιμικῆς*.
Bibl. Græc. vol. xii. p. 692.

^f Vid. Fabricii

After having caused a diligent search to be made in our publick libraries for an Arabic copy of this treatise to no purpose, I wrote to my good friend the celebrated Dr. Boerhaave, professor of physick in the university of Leyden, intreating him to inform me, if such an one could be found in the publick library there, which I knew to be very rich in Arabic manuscripts. A copy was accordingly found, which he got transcribed by the Arabic professor, and kindly sent it over to me; but it proved to be full of faults. This, however, I gave at two separate times to two gentlemen of character, to put it into Latin. One was Solomon Negri, a native of Damascus, extremely well versed in all the oriental tongues; the other John Gagnier, Arabic reader at Oxford: and they both performed the task with great diligence. But upon comparing the two versions, I observed that they differed in several places, not in the diction only, but even in the sense: wherefore, as I have no knowledge of the Arabic tongue, I could not determine which of the two to prefer. This incertainty made me apply to my worthy friend, the rev. Dr. Thomas Hunt, for several years past Arabic professor in the university of Oxford, and lately made Hebrew professor likewise, who, among his many eminent qualities, is universally esteemed a great master of the eastern languages. This gentleman, at my request, generously undertook the province of strictly collating the two Latin versions above-men-

tioned with the Arabic copy, in my prefence; and out of them he compiled this, which I now give to the publick; and doubtless he would have made it much better, had the Arabic copy been more correct.

London, Sept.

29, 1747.

A
 D I S C O U R S E
 ON THE
 S M A L L - P O X
 A N D
 M E A S L E S.

C H A P. I.

Of the origin of the Small-Pox.

BEFORE I enter on the medical part of my subject, I shall briefly enquire into the origin of the Small-Pox, and the manner of its propagation from those countries where it first appeared, almost over the whole face of the earth, as far as I can trace it in history: for these points once settled will throw a considerable light on the nature of the distemper, and the methods of cure, which I shall propose in the sequel of the discourse.

That this is a modern disease, whereby I mean, that it was not known to the antient Greek and Roman physicians, is to me a matter beyond all doubt. For I think they are widely mis-

taken, who endeavour to prove, that the anthrax, epinyctis, and such like eruptions on the skin, were our Small-Pox: because it is more than probable, that the ancient physicians, who were extremely diligent in the description and distinctive characteristics of all diseases, would not have been content with barely mentioning this, which is so contagious, and makes such dreadful havock among mankind; but would have minutely described it, had they been acquainted with it.

Wherefore we must have recourse to the writings of the Arabian physicians for the first notices of this disease. The chief of these was Rhazes, who lived about the year of Christ 900. We have a large volume of this great man, published under the title of his Continent, a treasure of physick, which seems to have been compiled from his common-place book. In this he informs us, that a physician, whose name was Aaron (who wrote thirty books of physick) had treated of the diagnosticks, the various kinds, and the method of cure of the Small-Pox^a. Now this Aaron was born at Alexandria, and in the reign of Mohammed practised about the year 622^b. Whence the learned Dr. Freind conjectured, that possibly the Small-Pox took its rise in Egypt^c. But the origin of the disease is carried farther back than the time of this Aaron, by Dr. John James Reiske, who says that he read the following words in an old Arabic manuscript of the publick library at Leyden: This year in fine, the Small-Pox and Measles made their first appearance in Arabia^d. By this year he means that of the birth of Mohammed, which was the year of Christ 572.

Now upon mature consideration of the whole affair, I am inclined to think that there are certain diseases, which are originally

^a Contin. 419. 2.

^b Vid. Abulpharajii hist. Dynast. p. 99.

^c Oper.

p. 330.

^d Hoc demum anno comparuerunt primum in terris Arabum variolæ morbili. Disp. inaug. Lug. Bat. 1746.

nally engendered and propagated in certain countries, as in their native soil. These by Hippocrates are called diseases of the country^e; and some of them, sprung up in various parts of Europe and Asia, from peculiar defects in the air, soil and waters, he has most accurately described^f: but the more modern Greeks call them endemick diseases^g. These, in my opinion, always existed in their respective native places, as proceeding from the same natural causes perpetually exerting themselves.

It is found by experience, that some of these are contagious, and that the contagion is frequently propagated to very remote countries by means suitable to the nature of this or that disease. For some not only communicate the infection by immediate contact of the sound with the morbid body, but have such force, that they spread their pernicious seeds by emitting very subtil particles; which lighting on soft spongy substances, such as cotton, wool, raw-silk, and cloathing, penetrate into them, and there remain pent up for a considerable time: in the same manner as I have elsewhere accounted for the wide progress of the plague from Africa its original country^h. Others, on the contrary, are infectious by contact alone. Wherefore the first sort may be spread by commerce, but the latter by cohabitation only.

Of this kind is the venereal disease; which, according to historians of the most undoubted credit, is a native of some of the American islands, especially Hispaniola, and was brought over into Spain near the end of the fifteenth century: thence, in the year 1495, it was carried to Naples, during the war between Ferdinand of Aragon and the French, by some Spanish troops, who had contracted it in the aforesaid island. For these and the French soldiers having at different times had communi-

cation.

^e Νεοήμαδα Απυρώσια.

Galen. Com. i. in Epidem. Hip.

page 242.

^f Lib. de aëre, aquis, & locis.

^g Ἐνδημίαις. Vid.

^h Discourse on the Plague, part i. chap. 1.

cation with the same women, according as the same towns alternately fell into the hands of the two contending parties; this filthy disease first spread itself over the two armies, thence made its way into Italy, and has since infected most parts of the habitable worldⁱ.

And I very well remember, that a certain English merchant, who had resided many years in Moscovy, assured me, that the venereal disease was hardly known in that country before the reign of the late Czar Peter the Great: because till that time the traffick carried on by the Moscovites did not require much communication or dealing with foreigners. But after that emperor had taken the resolution of visiting other parts of Europe, and had sent many of his subjects abroad to learn trades and manufactures; these carried back with them the dire effects of their unlawful lust into their native country; which raged there with the greater severity, as inflammations and ulcers are the more difficult to be cured in cold climates.

But to return to the Small-Pox. I really take this disease to be a plague of its own kind, which was originally bred in Africa, and more especially in Ethiopia, as the heat is excessive there; and thence, like the true plague, was brought into Arabia and Egypt after the manner above-mentioned.

Now if any one should wonder why this contagion was so long confined to its native soil, without spreading into distant countries; I pray him to consider, that foreign commerce was much more sparingly carried on in ancient times, than in our days, especially between mediterranean nations: and likewise, that the ancients seldom or never undertook long voyages by sea, as we do. And Ludolfus observes, that the Ethiopians in particular were ignorant of mercantile affairs^k. Therefore, when in process of time the mutual intercourse of different nations became

ⁱ Vid. Astruc de morbis veneris, lib. i. cap. 10, 11. lib. iv. cap. 7.

^k Hist. Æthiop.

came more frequent by wars, trade, and other causes; this contagious disease was spread far and wide. But towards the end of the eleventh century, and in the beginning of the twelfth, it gained vast ground, by means of the wars waged by a confederacy of the christian powers against the Saracens, for the recovery of the Holy land; this being the only visible recompence of their religious expeditions, which they brought back to their respective countries. From that time forward, wheresoever this most infectious distemper once got a footing, there it has obstinately held uninterrupted possession. For the purulent matter, which runs out of the pustules, being caught in the bed-cloaths and wearing apparel of the sick, and there drying, and remaining invisible, becomes a nursery of the disease, which soon breaks forth on those, who happen to come in contact with it; especially, if the season of the year, and state of the air be favourable to its action.

In this place, it may not be improper, in confirmation of the foregoing doctrine, to relate the following fact, which was attested to me by a gentleman of great experience, who had been for many years governor of Fort St. George in the East-Indies. While he was in that post, a Dutch ship put into the Cape of Good Hope, some of the crew of which had had the Small-Pox in the voyage thither. The natives of that country, who are called Hottentots, are so wild and stupid, that they might seem to be of a middle species between men and brutes; and it is their custom to do all servile offices for the sailors, who land there. Now it happened, that some of these miserable wretches were employed in washing the linen and clothes of those men who had had the distemper: whereupon, they were seized with it, and it raged among them with such violence, that most of them perished under it. But as soon as fatal experience had convinced this ignorant people, that the disease was spread by contagion, it appeared, that they had natural sagacity enough to defend themselves. For they contrived to draw lines round the infected part
of

of their country, which were so strictly guarded, that, if any person attempted to break through them, in order to fly from the infection, he was immediately shot dead. Now this fact seems the more remarkable, as it evinces, that necessity compelled a people of the most gross ignorance and stupidity to take the same measure, which a chain of reasoning led us formerly to propose, in order to stop the progress of the plague¹; and which, some time after, had a happy effect, not only in checking, but even entirely extinguishing that dreadful calamity in France, where it broke forth, and threatened the rest of Europe with destruction.

C H A P. II.

Of the nature and sorts of the Small-Pox.

HAVING sufficiently proved, in the preceding chapter, that the Small-Pox is a disease of the pestilential tribe; in order to a clearer knowledge of its nature, I will briefly premise my notions of pestilence.

All fevers, which attack the whole body, may be conveniently ranged under the three general heads of simple, putrid, and pestilential.

Simple fevers arise from a long-continued excess of velocity in the motion of the blood, and its consequences, a disturbance of its due mixture, and an interruption of the secretion of the humours in the several parts of the body.

Putrid fevers are caused, when, together with a concurrence of these circumstances, a lentor ensues in the capillary blood-vessels; and as this fizy blood is gradually pushed forward by the force of the circulation into the veins, it there becomes putrid, and

¹ Discourse on the Plague, part ii. chap. 2.

and impregnates the rest of the mass with a malignant quality, which is communicated both to the internal and external parts of the body.

Pestilential fevers, in fine, I call all those, which are accompanied with some sort of poison. Now, of whatever nature this happen to be, it not only infects and corrupts the blood, but more particularly seizes on the subtile nervous liquor, which is called the animal spirits. Hence it is, that these fevers act with greater rapidity and violence, and are much more fatal than the other sorts. But this one circumstance is common to all fevers, that nature endeavours to conquer the disease, by raising some struggle or other, in order to throw forth from the body whatever is prejudicial to life.

Now, whereas the word nature is made use of by physicians in the cure of all diseases, I will here, once for all, plainly declare my sentiments of what we ought to understand by that word. That there is something within us, which perceives, thinks, and reasons, is manifest beyond contradiction; and yet the nature of that something cannot be fully and perfectly comprehended in this life. Wherefore I shall resign the disquisition of this point to those, who, while they know too little of, and care less for things falling under their senses, take great pleasure in investigating those things, which human reason is incapable of conceiving. However, thus far the soundest philosophers agree concerning it, that it is somewhat incorporeal. For how can sluggish matter, which is of itself void of all motion, be the source and first cause of thought, the most excellent of all motions? Wherefore, it is sufficiently evident, that this first mover within us is a spirit of some kind or other, intirely different and separable from terrestrial matter, and yet most intimately united with our body.

Moreover, to me it seems probable, that this active principle is not of the same sort in all; that the Almighty Creator has endowed man with one sort, and brutes with another; that the

former so far partakes of a divine nature, as to be able to exist and think after its separation from the body; but that the latter is of such an inferior order, as to perish with the body. The former was by some of the antients called animus, the latter anima^m; and they believed, that they were both ingendered in our species: but this I take to be an erroneous position. For as their anima suffices for the functions of life in brutes, so our animus stands not in need of such an assistant. Now this matter, if I am not mistaken, stands thus: such is the composition of our fabrick, that, when any thing pernicious has got footing within the body, the governing mind gives such an impulse to those instruments of motion, the animal spirits, as to raise those commotions in the blood and humours, which may relieve the whole frame from the danger in which it is involved. And this is done in so sudden a manner, that it should seem to be the effect of instinct, rather than voluntary motion; though it be effected in us at the command of the animus, and in brutes by the power of the anima. And indeed, those very motions, which are commonly called natural and vital, as those of the heart, lungs, and intestines, which persevere through the whole course of life, even when the will cannot be concerned in them; as they have their beginning from the mind, so they are perpetually under its direction. I could easily bring many arguments in confirmation of these sentiments, but they would be superfluous in this place. Besides that I am happily anticipated by the learned and ingenious Dr. Porterfield, fellow of the royal college of physicians at Edinburgh, who in a curious dissertation published some years sinceⁿ, has treated this subject with
such

^m Juv. Sat. xv. 148.

Mundi

Principio indulget communis conditor illis

Tantum animam, nobis animum quoque.

Vide etiam Davisii Not. ad Ciceron. Tusc. disput. lib. i. cap. 10.

ⁿ Vid. Medical Essays published at Edinburgh, vol. iii. Essay xii. and vol. iv. Essay xiv.

such perspicuity, that there can be no room left for doubt.

But from philosophy I return to medicine. Our sagacious Sydenham was so far of this opinion, as to assert, that a disease is nothing else but an effort of nature to throw off the morbid matter, for the health of the patient^o. And Hippocrates, in his usual manner, laconically expressed the same thing thus : Nature is the cure of diseases^p. Now this I have observed more particularly in pestilential fevers, in which the violence of the distemper breaks forth on the skin in the form of pustules, carbuncles, and buboes ; all which are the very venom of the disease, as the common experiment of giving the Small-Pox by inoculation plainly demonstrates. Thus having made it appear, that the Small-Pox is an envenomed fever, I come to explain its different sorts ; for as to its history, I refer to Dr. Sydenham, who was the first that divided its whole course into certain stages, and gave the method of cure in each.

Most authors divide the Small-Pox into the distinct and confluent sorts, and estimate both sorts by the size, number, and manner of eruption of the pustules. But in the prognostick, they make so wide a difference between them, that they pronounce the former sort to be almost void of all danger, but the latter always dreadful in its consequences. Thus much indeed is most certain, that the confluent sort are, generally speaking, much worse than the distinct, and that many more die of those than of these. But yet it sometimes happens, that a distinct sort may prove more dangerous than the common confluent sort. Moreover, there are many symptoms extremely dangerous, which are peculiar to the distinct kind, as I shall shew anon. For the danger does not so much arise from the quantity of the purulent matter, as from other circumstances, which shall be explained in their due place.

^o Observation. medic. circa morborum acutorum historiam, at the beginning.

^p Νέσων φύσις; ιστορίαι. Epidem. lib. vi.

Wherefore, in my opinion, the Small-Pox may more accurately, and agreeably to the nature of the disease, be divided into simple and malignant.

I call simple all that sort, in which the eruption is attended with a slight fever of short duration, the pustules fill kindly, make good matter in a few days, and in fine, fall off in dry scabs.

The malignant sort is that, in which the eruption appears with a malignant fever, the pustules hardly come to any tolerable degree of maturity, and either suppurate not at all, or if they do in some measure, as the fever is never off, it is with great trouble that they at length end in little crusts.

That malignity appears in such various forms, according to the different nature of the pustules, that its characteristick signs have given various appellations to the Small-Pox : whereof the chief differences, which have fallen under my observation, are these that follow. For the pustules are either crystalline, warty, or bloody. I am well aware, that authors have run into a greater number of subdivisions ; but I look on the rest to be either a combination of some or all of these, or only different degrees of the same kind : a thing which frequently happens in an irregular disease.

I call those pustules crystalline, which, instead of thick, well-digested matter, contain nothing but a thin, pale water, and are in some measure pellucid. And this sort is sometimes observed, not only in the confluent, but also in the distinct Small-Pox.

They are called warty, when the pustules contain no fluid, but grow hard and prominent above the skin in the manner of warts. These are peculiar to the distinct sort.

The bloody pustules are produced more ways than one. For I have seen cases, where, at the very beginning of the disease, the pustules were so many small tubercles full of blackish blood, resembling those raised on the skin, when pinched with a forceps. And these were followed by an intermixture of purple and livid spots,

spots, such as physicians describe in the true plague. But it more frequently happens, that pustules coming out very thick, on the third or fourth day after, when they ought to fill, become livid, and a little bloody, with black spots spread over the whole body ; which forebode death in a day or two, because they are real gangrenes. It very often falls out at this time, that a thin blood flows not only out of the patient's mouth, nose, and eyes, but also by every outlet of the body ; but more especially by the urinary passages, through which it likewise issues sometimes on the first days of the distemper. These are manifestly of the confluent sort.

To these Dr. Freind^a has added a fourth kind of Small-Pox, which he calls *siliquose*, in which the pustules resemble little round, soft, hollow bladders, and contain no fluid. But this I place among the crystalline sort, the only difference between them being, that in this case one part of the fluid, which had been thrown into the pustules, flies off through the skin, and the other is absorbed by the lymphatics back into the body.

It is always a difficult task, and sometimes a needless one, to investigate the true causes of things. But as the publick may perhaps expect, that I should account for the above-mentioned differences in this disease ; I shall say, that the principal reasons of these differences, which have occurred to me upon mature consideration, are, the almost infinite variety of temperaments in various individuals ; the seasons of the year and their changes, and in fine, many accidents which befall the body, between the time of catching the infection and the appearance of the disease. For inoculation shews, that the Small-Pox does not break forth before the eighth or ninth day from receiving the infection.

Possibly it may be thought strange, that, in enumerating these causes, I have not mentioned a word of the nature of the infecting particles. But, besides that the knowledge of this is

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^a Epist. De quibusdam variolarum generibus,

not attainable by us, it seems to have no great influence on the production of this or that particular sort of the distemper. For we frequently observe, in the same family, where one person catches it from another, that some have a favourable, and others a bad sort.

But such is the power of temperaments of body, that they descend to those of the same blood by a sort of hereditary right: whence some diseases are found to be familiar and fatal to certain families.

As to the seasons of the year, we find, by daily experience, that some of them are fitter to produce certain diseases than others; that they are the causes of epidemick fevers; and that those chiefly, in which some fluid is to be thrown off by the skin, are the most remarkably liable to be affected by their changes.

But numberless are the things comprehended in the third article, to wit, all those accidents, which happen to the body from the time of taking the infection to the eruption of the pustules. For the poison is far from lying quiet all this while, but is constantly and gradually exerting its malignity, by first corrupting the animal spirits, and then the whole mass of blood and humours. Wherefore, if bodily exercise, diet, or the affections of the mind (which have great power in this case) should happen to make any particular alteration in the fermenting fluids, they may easily occasion various sorts of pustules, possibly in the manner I am going to explain.

The simple Small-Pox are suppurations made, while the blood is not so far vitiated, but that the derivations of the humours into the proper parts may be effected tolerably well, and the natural functions are not entirely hurt. But in the malignant sort the case is quite different. For the whole mass of humours is corrupted more or less, according to the nature of the disease; and the blood is in such confusion, that the purulent matter cannot be thrown upon the skin. Now, in this case, sometimes a thin
fluid

fluid is thrown out, which, when watery, makes crystalline pustules; when thick and viscid, warty; and filiquose, in fine, when the fluid has been reformed by the lymphatics into the blood, and has left the pustules quite empty. Besides, the texture of the blood is too frequently broken to that degree, that it is obstructed, and stagnates in the small vessels: whereupon, the skin is strewed with black spots, which are so many real gangrenes, and hemorrhages ensue through all the outlets of the body; whence this is called the bloody sort. That these horrid symptoms are the effects of an acrid poison, appears plainly; because the same happen to those, who have been bit by the hæmorrhoids, a Lybian serpent, according to Lucan's beautiful description:

A fierce hæmorrhoids struck both his fangs,
 Deep into Tullus; a brave valiant youth,
 And fond admirer of great Cato's worth.
 And as Corycian saffron, when 'tis squeez'd,
 Pours forth its yellow juice through all the holes
 Of the hard pressing boards; so from the pores
 Of all the parts flow'd ruddy venom'd gore.
 His tears were bloody; nature's passages,
 For their own humours, were all fill'd with blood.
 His mouth, his nose, choak'd up with filthy clots:
 Red sweats transpir'd from all the skin inflam'd.
 His body seem'd one universal wound^r.

But from these objects of terror, it is time to pass to those which may afford comfort.

^r Lib. ix. ver. 806.

C H A P. III.

Of the methods of cure in the Small-Pox.

IT is most evident, that all pestilential diseases are accompanied with the highest inflammation of the blood and humours, and therefore they all require emptying and cooling. I begin with the simple Small-Pox, and shall afterwards descend to the treatment of the malignant sort in its several varieties.

But in this place it seems proper to clear up two material points. The one regards the management of the sick, and the other, the diet proper for him.

With respect to the first, serious attention should be given both to the season of the year, and to the strength of the patient. For the same things, that are done with safety in summer, may be attended with danger in winter; and young lads or robust men easily bear what might destroy infants, or weakly women. But let this be a general rule, to keep the patient in bed during the first days of the distemper, taking care to defend him from the inclemency of the winter by proper means, and to moderate the excessive heat in summer by cool air. But to chill and as it were to freeze up the sick in winter, is not the part of a prudent physician, but that of a fool-hardy empirick, trying experiments at the expence of unhappy people's lives. Wherefore a mean is to be observed herein, by managing the patient in such a manner, as neither to stifle him with heat or clothes, nor check the eruption and perspiration by cold. However, great care ought to be taken in general, to supply him with pure and cool air, which he may take in plentifully: because a hot air causes difficulty of breathing, checks the secretion of urine, and increases the number of pustules on the internal organs of the body; the consequences whereof we may justly apprehend

to be inflammations, and, towards the end of the disease, gangrenes.

With regard to diet, it ought to be very slender, moistening, and cooling; such as oatmeal or barley-gruel, &c. Nevertheless, as the food is to be adapted to the several stages of the disease, the best regimen in the beginning is that, which will keep the body open, and promote urine. These advantages are obtained by boiling preserved fruits with their food, especially figs, damascene plumbs, and tamarinds; and giving them subacid liquors for drink; as small-beer acidulated with orange or lemon juice; whey turned with apples boiled in the milk, or with wine; emulsions made with barley-water and almonds; Moselle or Rhenish wine plentifully diluted with water; or any other things of this kind.

When this sort of diet did not keep the body open, the Arabian physicians added manna to it; but this they did sparingly, and with caution. For it is quite necessary, says Avicen, that the body be open in the beginning*. Which is one of the most important advices, that can be given in this disease, if to it be added, that urine must be made plentifully. For there is a wonderful correspondence between the skin and the kidneys; whereby, whatever fluid is wont to be secreted by the cuticular glands, may with great ease be evacuated by the urinary passages. Wherefore it is very proper to draw off as much of the matter of the disease as can be done, by these passages, in order to prevent the overloading of the internal parts.

Now let us pass on to medicines, and, in the first place, blood-letting is necessary. But as dissensions frequently arise on this subject, some rules are to be laid down concerning it.

It is agreed on all hands, that this remedy is not very suitable to the tenderest age. But yet, as the blood of infants is generally too thick, and too much in quantity for the bulk of the body; and as they are oft-times seized with convulsions, upon the appearance of the disease, some evacuation ought to be

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made:

* De variolis & morbillis.

made : which may be safely effected by leeches applied to the temples, or behind the ears. Likewise, if blood cannot be drawn from the arm, in most young subjects either of the jugulars may be opened without inconvenience.

That regard is to be had to the patient's strength of what age soever, is manifest to all. But the weakness is seldom so great, as not to bear some loss of blood, unless it be after some extraordinary evacuations. Nor is the pulse to be over-much depended on in this case : for it often happens, that the thickness of the blood prevents the secretion of the usual quantity of animal spirits in the brain, and that the vital fluid is not propelled from the heart with due force : in which case, by removing the oppression, the patient's strength is observed even to increase with the bleeding.

But in what proportion blood is to be taken away, will be best determined by the vehemence of the disease. Many of our physicians imagine that they have done their duty, when they have ordered one bleeding, and are vastly cautious of opening a vein at all, after the first appearance of the pustules, for fear of checking the eruption. But this is certainly an ill-timed caution : for in youths and adults it is often necessary to draw blood two or three times, only with an intermission of two or three days between each time. And indeed blood-letting is so far from being an obstacle to the eruption of the pustules, if the patient be not too weak, that it forwards it considerably ; and for the very same reason, that, in large abscesses, when there is too great a fullness, and the heat too intense, the suppuration is brought on quicker and better by taking away some blood.

I have often observed, when in the beginning a vast number of small pustules foreboded a disease of the worse kind, that the face of affairs was so remarkably changed upon one or two bleedings, that the pustules increased in size, and diminished in number (the greatness of the disease thus giving way to the greatness of the remedy) by which means nature acquired sufficient strength

strength to expel the noxious humour. For it is most certainly true, that nature labours at the expulsion of the poison in the most perfect manner, that is, endeavours to make the pustules fill up as much as possible; and for that end she requires every thing to be quiet within the body, and always abhors confusion. And indeed, the reason why the confluent Small-Pox is worse than the distinct sort is not, because the matter of the disease is more abundant in the former than in the latter, but because it is not pushed out in a proper manner. For upon a strict examination we generally find, that the greater quantity is discharged in the distinct sort.

Now to conclude this head, such is the benefit of large and reiterated bleeding, that it is observed to prevent those evils, which often attend the disease; as a delirium, convulsions, difficulty in breathing, and the like. For the dissection of dead bodies shews, that the infection is not confined to the external parts of the body, but seizes on the internal parts also. For I myself have seen subjects, in which the lungs, brain, liver, and intestines were thick beset with pustules. Nor have I the least doubt, but that those sudden deaths, which sometimes happen towards the end of the disease, when there seemed to be no room left for fear, are occasioned by the efflux of the purulent matter from the bursting pustules on one or other of the nobler parts. Wherefore, no fever is attended with more uncertain signs, on which to ground a sure prognostick, than this, of which we are treating. Upon the whole, there is no time of the disease, wherein it may not be necessary to draw blood; if the violence of the fever require it, and the patient appear able to bear it. For it is always better to try a doubtful remedy than none.

A phrenzy, coming on the fourth day of the eruption, is justly esteemed a very bad omen; insomuch that Dr. Freind says, that he never saw a patient recover, who had had this symptom[†]. But I can positively declare, that I have had better

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fortune;

[†] Epist. de quibusdam variolarum generibus.

fortune; having recovered many, who had been seized with a delirium at that time, by drawing blood immediately, and then throwing in a clyster.

After taking away as much blood as is requisite, it is proper to purge the body; which may be done with safety enough, any time before the eruption of the pustules. But the purge must be of the gentle kind; such as the infusion of senna with manna, or manna alone, especially for children. For no disturbance is to be raised in the body. But first a vomit should be given, if there happens to be any collection of phlegm or bile in the stomach, or the stomach to be loaded with food unseasonably taken.

As soon as it is certain, that the eruption is near at hand, most physicians are of opinion, that it ought to be promoted by all means. Yet we are to remember, that this is the proper work of nature; and therefore great care should be taken, neither to increase the motion of the blood over-much, nor suffer it to grow languid.

It was a wise saying of Asclepiades, that he made use of the fever for its own cure^a: whereby he meant, that the fever is to be regulated in such a manner, that itself may throw off whatever is noxious to the body. Wherefore the true intention in this case, is to keep the inflammation of the blood within due bounds, and at the same time, to assist the expulsion of the morbid matter through the skin. For both which purposes a medicine, which I have experienced to be useful, is a powder composed of two parts of the bezoardick powder, and one part of purified nitre; and sometimes of equal parts of both. An adult may take half a drachm of this powder three or four times in a day, diminishing the quantity for children, in proportion to their age. And if the effervescence of the blood run very high, a proper quantity of spirit of vitriol may be added to the patient's drink. But if there be any heakings or reachings to vomit, they

^a Cels. lib. iii. cap. iv.

they will be removed by draughts containing half an ounce of juice of lemons, with one scruple of salt of wormwood.

Now, concerning those medicines which ease pain, and procure sleep, in this severe disease, these are not to be used over-hastily: for all anodynes in some measure obstruct the separation of the morbid humour from the blood, unless the pain happens to be excessive: and moreover, if the violence of the fever has raised a delirium, they generally make it worse. Wherefore, it is not proper to employ them, until the eruption of the pustules be compleated; but after that, narcoticks may be administered with safety. Thus it will be right to give the patient a dose of the thebaick tincture, or diacodion, every evening, especially if he be a youth or an adult person; for these medicines agree not so well with infants. And sometimes, in cases of very great inquietude, the dose is to be repeated in the morning. For the suppuration of the matter, stagnating in the pustules, is forwarded by quiet and sleep. But if, towards the end of the disease, the patient happens to be seized with a shortness of breath, or danger of choaking from viscid slime, these medicines are to be intirely prohibited. In the mean time, if the patient is costive, which is generally the case, and the fever continues, the body is to be opened with a clyster every second or third day.

It may be needless to observe, that, if this method is proper in the distinct Small-Pox; it will be found more necessary still in the confluent, which is attended with greater fear and danger.

From the simple I now pass to the malignant Small-Pox, of which I have already established three sorts, to wit, the crystalline, the warty, and the bloody.

Now, this observation holds good in all kinds of the disease, that the more the pustules tend to suppuration, the greater are the hopes of recovery; and therefore, when that does not go on according to our wishes, all possible means are to be employed to throw the morbidick humour on the skin; with which intention every thing is to be done in this case, which we have proposed

posed in treating of the simple sort. But yet each species of the malignant sort requires a peculiar consideration.

Whereas, in the crystalline sort, the water of the pustules can never be brought to a laudable suppuration; it ought to be carried off by those passages in the body, which are naturally adapted to the secretion of the thinner fluids. Now I have said above, that there is a great correspondence between the skin and the kidneys. Therefore, while the thinnest parts of this water are made to transpire through the skin, the grosser parts ought to be drawn off through the urinary passages, by diuretick medicines. Of this tribe there is nothing better than nitre, and that may be administered three or four times a day, in such quantities as may not offend the stomach, to wit, a scruple, or half a drachm, dissolved in small wine, which is the only sort that agrees with this disease, till towards the end; when it may be proper to allow the patient a little Canary (Dr. Sydenham's favourite liquor) or any other soft and generous wine to support his strength. But while nitre is thus taken, it will be right to interpose those medicines, which cherish the heart, and promote the flux of the humour into the pustules: such as Raleigh's cordial, or the cordial confection: the bezoardick powder, sometimes with a little saffron; and the plain spirit of hartshorn. Besides these, on the fifth or sixth day of the eruption, blisters are to be applied between the shoulders, and to the arms and legs: for which purpose, the blistering epithem is most convenient, as its soft consistence enables it to reach the skin between the pustules, and stick to it. For by this discharge of the serosities, the fever, which increases, when there is no farther derivation of humours to the skin, is seasonably prevented.

I know indeed, that most of our physicians apply this remedy earlier, and even on the first days of the disease, in every malignant Small-Pox; but there is just reason to fear, that the great commotion raised in the blood by the acrimony of the flies

might be an obstacle to the due propulsion of the humour into the beginning pustules.

The warty Small-Pox is more dangerous than the crystalline; because the matter of the disease, being too thick, can neither suppurate, nor pass off by urine. Wherefore it is necessary to use the utmost endeavours to take off the fever, and to provoke sweat, in order to digest the morbid humour, by the cordial medicines afore-mentioned. And blisters ought to be applied in this case likewise. But the Arabian physicians pronounced this sort of the disease to be always fatal*.

Lastly, that sort, which I have called the bloody Small-Pox, requires peculiar attention. Now in this sort, if there is any room for physick, those medicines bid fairest for success, which by their stypticity thicken the blood in some measure, and so check it, that it cannot break through even the smallest arteries. The best of this kind are the Peruvian bark, alum, and that spirit which is called oil of vitriol. Now these are to be used alternately in this manner. A drachm of the bark may be given every sixth hour; and, three hours after, a proper quantity of alum. It will be a very powerful medicine, if thus compounded. Melt three parts of alum on the fire, with one part of that inspissated juice, which is improperly named dragon's blood: when the mass is grown cold, reduce it to a powder; a scruple of which, made into a bolus with conserve of red roses, will be a proper dose. The most convenient manner of giving the oil of vitriol, is in the tincture of roses; five or six spoonfuls whereof may be taken several times in the day. And besides, the patient's common drink may be acidulated with it; especially, if purple or black spots appear interspersed among the pustules. And this medicine will be of great service, not only in the bloody, but in all the other sorts likewise, accompanied with these spots. This one thing more I will add, that I have experienced the use of blisters to be safe enough in this case, when

a delirium

* See Rhazes's treatise annexed, chap. viii.

a delirium requires their application. I have indeed seen some patients recovered by this method, who had discharged large quantities of blood by the urinary canal at the time of the eruption of the pustules; but it is worthy of notice, that, in all these, the disease terminated in some considerable evil. For they were tortured, either with boils breaking out in many parts of the body, or with glandular swellings under the ears or arm-pits, which were not easily brought to suppuration. I likewise remember the case of a young man, one of whose tonsils was destroyed by a gangrenous ulcer which was very troublesome to cure. Thus upon the whole it is manifest, that it is extremely difficult to clear the mass of blood of this poison; and that a perfect recovery is not to be procured without a suppuration, either in its due course of time, or in the last stage of the distemper.

But in every sort of this disease, it is proper to open the body on the decline, that is, on the ninth or tenth day from the eruption; because a putrid fever generally comes on about this time, while the pustules are drying; or upon the subsidence of the swelling of the inflamed skin, where there is no suppuration; which fever cannot be taken off with equal safety by any other means. But gentle catharticks alone are to be employed in this case, such as I have advised before the eruption of the pustules.

This whole affair I formerly explained, and illustrated with proper examples, in my letter to Dr. Freind^y; and that gentleman likewise, abundantly confirmed it afterwards, by the authorities of antient and modern physicians. So that whosoever refuses his assent to this practice, must resolve not to see at noon-day. All fevers have their certain periods; and where the poisonous matter has once infected the humours, the putrid fuel of the disease can hardly be thrown out of the body early enough. And indeed, when this rule is not observed, we daily see the distemper followed

^y Vid. Freind. Commentar. vii. ad Hippocrat. de morbis popularibus. Et Epist. de purgantibus in secunda variolarum febre adhibend.

followed immediately by a hectick fever, attended with a cough, spitting of purulent matter, shortness of breath, and other symptoms of the lungs being affected.

But I must observe in this place, that, however beneficial purging may be at this time ; yet, if the body happens to be too loose, either from the natural state of the intestines, or by frequent clysters, this remedy becomes less necessary, or at least, may be postponed for some days. For great regard is to be paid to the patient's strength, which the length of the illness has more or less impaired.

Moreover, it is requisite to be very circumspect, whether there be any remains of the purulent matter lurking under the withered skin of the pustules ; for this is sometimes so manifestly the case, that though the scabs appear dry and hard ; yet upon some of them breaking here and there, there issues forth very fetid matter. In this circumstance, the body is not to be purged, but rather to be supported by proper diet, until the matter is all come away ; which I have seen continue running to the twenty-fourth day of the disease, and yet the patient recovered. I shall never forget the case of a certain young man of a very robust constitution, who had so dreadful a sort of the confluent Small-pox, that when the pustules should have ripened, his whole face was become black and dry, and in short, thoroughly mortified. As the case seemed quite desperate, I ordered incisions to be made to the quick in many places, and fomentations of a decoction of emollient and warm plants, with the addition of camphorated spirit of wine, to be applied to the parts : whereupon there followed a discharge of matter from the incisions of so offensive a smell, that none of the attendants could bear to stay in the room ; and having at the same time promoted this discharge by proper digestives, and duly purged him, he at length recovered. But his mangled face bore the lasting marks of the malignity of the distemper, and of the goodness of the cure.

In fine, it will be of use at this time to take away some blood, if the heat be too great, and the patient have strength enough left to bear it.

Whosoever thoroughly considers all the circumstances of this subject, which I have hitherto explained, must justly wonder how the learned Dr. Boerhaave could be induced to hope, that some time or other, a specifick antidote may be found against this contagious poison;^z that is, by which it may be so thoroughly destroyed, that though it had been received into the body, it may not produce the disease. But the principles and elements of things are so certain, and so well established by the permanent laws of nature, that whosoever would endeavour to change them, would act like those philosophers by fire (as they style themselves) who labour hard to transmute the baser metals into gold; and when continual disappointments have convinced them of the vanity of their hopes, actually extract gold out of the purses of the ignorant and credulous by the fumes of their charcoal.

This one observation I must add, that there is no species of fever, which requires the body to be thoroughly cleared of the remains of the disease, more than this. Wherefore, upon the patient's recovery, blood is to be drawn, if his strength will bear it; and catharticks are to be given several times at proper intervals. After which, the body is to be restored to its former state by a course of milk, especially that of asses, with suitable food, and the air and amusements of the country.

I shall close this long chapter with the account of a very malignant Small-Pox in a youth of fifteen years of age, communicated to me by my son-in-law, the learned and ingenious Dr. Wilmot; who, from the fifth day of the disease, attended the patient jointly with Dr. Connel.

In the beginning of the fever preceding the eruption, the patient was directed to be let blood, and to take a vomit, and the
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^z Aphor. de cognoscendis & curandis morbis, 1390, 91, & 92.

next morning a gentle purge: the day following, the Small-Pox flushed out. The pustules were very numerous and small all over the body, looking more like a rank Measles than the Small-Pox. As his fever ran very high, he was ordered draughts of Gascoign's powder with nitre, to be taken every six hours; and to drink plentifully of barley-water acidulated with spirit of vitriol.

On the fourth day of the eruption, as he was very delirious, in order to procure sleep, a paregorick of six drachms of diacodion was given him, which did not produce the effect.

The fifth day, there was not the least swelling of the face; his pulse was quick and full, his heat intense, and the delirium not abated. Wherefore he was ordered another bleeding; the nitrose draughts were continued, with the addition of five grains of myrrh to each; as likewise barley-water with spirit of vitriol, and the paregorick as before.

The seventh, the appearance of the disease was still the same, with the addition of an oppression of his breath, and a very troublesome dry cough. Diacordium was added to his nitrose draughts, and he was ordered a solution of gum ammoniack to be taken, a spoonful at a time, as occasion required; and the paregorick continued.

The eighth, he complained much of a most acute pain in his head; his shortness of breath and cough were increased, his pulse low, and there were no signs of suppuration; nor the least swelling in the face or hands: but the skin of his face looked like a piece of parchment. Blisters were ordered to be laid on his arms and legs, and plasters, made of equal parts of the cephalick and blistering plasters, to be wrapt round his feet: likewise draughts containing of mithridate half a drachm, and of volatile salt of amber half a scruple, to be taken every sixth hour; and a gargle of pectoral decoction, and oxymel of squills.

The tenth, as every thing was grown worse, besides continuing the same medicines, blisters were ordered below the elbows.

The eleventh, his pulse being much lower, and the patient weaker, a mixture with Raleigh's confection was ordered to be taken often by spoonfuls, and the other cardiacks continued.

On the twelfth, the pulse being scarcely perceptible, and his breath oppressed to the last degree; when all hopes of success were given up, a fit of coughing, in which he was almost suffocated, brought on a spitting of a limpid, fetid humour, equal in quantity to a salivation raised by mercury. And this flux continued twelve days without any apparent abatement: from thence it gradually diminished for four days, when it stopped entirely.

By the sixteenth day, the disease, together with that discharge, had so far exhausted him, that he was scarce able to turn in his bed: and yet his spirits were so much better, that he could take plentifully of liquid nourishment. Whereby gathering strength his fever had now the appearance of a hectic only; for which he was ordered to lose five ounces of blood, to take draughts of lemon-juice, and salt of wormwood, with a little sperma ceti dissolved in them, every four hours, and to drink asses milk every morning.

By this method, with the repetition of bleeding to five ounces two or three times, and now and then purging him gently with rhubarb; together with elixir of vitriol in Bristol-water, and the country air, he in time happily recovered.

In this case we have a most remarkable instance of what I have already said more than once, that is, how solicitous nature always is, at any rate to expel the poisonous matter of this disease out of the body.

C H A P. IV.

Of accidents in the Small-Pox.

MANY symptoms and circumstances attend the Small-Pox, which, as they neither commonly occur, nor seem to depend on the nature of the disease, either affright, or perplex the physician. Wherefore it may not be improper to make some remarks concerning them.

Sometimes the patient is seized with convulsions, just before the eruption. But this symptom is more terrifying than dangerous; and in children particularly, those convulsions, which frequently come on before the distemper appears, are generally rather a good, than a bad sign. Now in this case, though it may seem strange, blood-letting is to be carefully avoided; but a blister is to be applied to the neck, and to the soles of the feet plasters made of equal parts of the cephalick and blistering plasters: not forgetting at the same time to give those medicines inwardly, which experience has shewn to be antispasmodick. Of these the chief are, wild valerian root, Russian castor, and the spirits and volatile salts, chemically extracted from animals. For it has been frequently observed, that, upon drawing blood in this case, the disease ended fatally. I can assign no other reason for this event, but that those involuntary motions are occasioned by the patient's weakness; which is so increased by that evacuation, that nature becomes incapable of throwing out the morbid matter upon the skin. But the thing is otherwise in adults, who, if not too weak, ought to lose a moderate quantity of blood, and then be put into the foregoing method.

The disease begins sometimes in a different, and almost contrary manner. For the eruption appears without much fever or pain; for which reason there seems to be no danger. But that
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fond security is very frequently ill-grounded. For at the time when the pustules ought to tend to maturity, as if nature were lazy, and not attending to her duty, there is no suppuration made: hence the fever increases, with inquietude of body, anxiety of mind, difficulty of breathing, and a delirium; which carry off the patient in a few days. In this state, the fever ought rather to be raised than checked; and therefore warm medicines are to be directed, which promote suppuration, by increasing the motion of the blood, and thinning the humours: such are the Virginian snake-root, the contrayerva-root, saffron, asa fœtida, myrrh, and the like. But above all, blisters must be laid on all the limbs. Such is the necessity of some evacuation or other in this disease, that if the matter of the infection be over-abundant, as it happens in bad cases, nature never fails endeavouring to throw off the load. Thus in adults the spitting comes on upon the first days of the eruption; whereas children, who seldom spit, have a looseness almost through the whole disease. Both these evacuations are of great importance, and therefore as the looseness is not to be inconsiderately stopped in children; so in adults, if the spitting does not go on to our wishes, it ought to be promoted by medicines, which stimulate the glands of the mouth; especially gargles made of a decoction of mustard seed and pepper, with the addition of oxymel. For in the confluent and malignant Small-Pox, if this flux does not arise, and even continue to the end of the disease, it is a very bad sign.

Sometimes a suppression of urine makes the patient suffer great pain, receiving little or no relief from diureticks. In this case Dr. Sydenham directed, that he should be taken out of bed, and exposed to the cool air: which generally has a good effect. But the most convenient method will be, to open the body by a clyster, especially if, the pustules now appearing, there be any fear of taking cold; and then to insist a little on diuretick medicines; for which purpose Glauber's salt is particularly useful, as it is both laxative and diuretick.

Whenever a woman with child is seized with the Small-Pox, the physician may justly dread the consequences. For he has reason to fear a miscarriage, which exposes his patient to two sorts of danger, the one from the new fever, which attends that accident; the other from the loss of blood, which may bring her very low. And therefore the farther she is advanced in her pregnancy, the greater risque she runs; because the delivery of a large child causes a greater flooding than that of a small one. I can however assert from my own knowledge, that a certain woman was delivered of a son at the full time, while she was actually labouring under this disease; and yet both the mother and the child did well; but this is a case equally extraordinary and fortunate. But still a good deal depends on the time of the disease, when the abortion happens: because the weakness occasioned thereby is the more dangerous, the more nearly it coincides with the time of the ripening of the pustules. Wherefore, if the efflux be more than nature usually requires, those medicines are to be given, which I have proposed in the bloody Small-Pox.

Now, whereas these cases fall out various ways, and physicians have been divided in opinion concerning some of them; it may not be improper to make some animadversions on them separately.

When a woman in the Small-Pox suffers abortion, the child most commonly comes into the world with the distemper on it; but not always. The reason of this difference will easily be understood, by duly considering what I have already said concerning infection^a, and comparing it with what I shall hereafter say concerning the inoculation of the Small-Pox^b. Whereby it will plainly appear, that the seeds of the disease are subtle particles, exhaled from the pustules come to maturity; which do not produce the effect, till eight or nine days after their entrance into a
sound

^a Chap. i.

^b Chap. v.

found body. Upon which account, when the child comes into the world, before matter is made in the pustules on the mother, it has no visible marks of the distemper. And thus it sometimes happens, that the Small-Pox, which the infant has contracted in the womb, breaks forth on the second, third, or any other day before the eighth from the delivery, whether the child be come to its full time or not; as will appear by the following case, which lately fell under my own observation.

A lady of quality was, in the seventh month of her pregnancy, seized with so malignant a sort of the confluent Small-Pox, that there was no appearance of any one favourable symptom. For she neither spit plentifully; nor did the swelling of the hands or feet come on, upon that of the face subsiding; nor in fine was she assisted by a flux of urine on the decline of the disease; but on the contrary, her face was all covered with small pimples, which made little or no matter. In this condition, she was, on the eleventh day of the distemper, pretty easily delivered of a son, who brought no marks of the infection into the world; and she died on the fourteenth day. But in the morning of the fourth day following, the infant was seized with convulsions, the forerunners of the eruption, which appeared the same day, and he died in the evening. In this case it is plain, that some suppuration having been made, as usual, on the eleventh day; the distemper passed from the mother to the child, which was not to break out till eight days after.

But in case there is no miscarriage, the child will be free from the disease during his whole life; unless he happens to be born before the pustules were come to maturity. For as something naturally inherent in our constitution renders the body liable to the infection; so, when this debt is once paid to nature, we are secure ever after. But the infant in the womb sometimes catches the distemper, without the mother being affected; as I shall prove by this remarkable instance, which I well remember. A certain woman, who had formerly had the
Small-

Small-Pox, and was now near her reckoning, attended her husband in the distemper. She went her full time, and was delivered of a dead child. It may be needless to observe, that she did not catch it on this occasion : but the dead body of the infant was a horrid sight, being all over covered with the pustules; a manifest sign that it died of the disease, before it was brought into the world. Wherefore, upon the whole, let none entertain the least suspicion, that the same person can possibly have this distemper twice. But the reason why the body is liable to the infection once, and no more, is to me as entirely unknown, as to the most ignorant of mankind. But this I will add, that an infant in the womb may have the good luck to go through the disease, and yet the marks be quite effaced before the birth.

From what we have said concerning abortions, it is easy to comprehend what judgment ought to be formed of the monthly evacuations coinciding with the Small-Pox, a circumstance, at which people are apt to be alarmed. For this evacuation is of the same kind with the flooding, which follows upon abortion : and whether it happens at the usual time, or is brought on irregularly by the extraordinary effervescence of the blood ; in both cases, it rather affords relief than threatens danger. However, if in either case the discharge should prove so great, as to weaken the patient over much ; it must be restrained by those medicines, which I have recommended in the bloody Small-Pox, without neglecting to draw blood, if requisite. But we know by experience, that women have sometimes uterine discharges through the whole course of the disease, without loss of strength, or any other inconvenience.

The same judgment may be formed of hæmorrhages at the nose, which frequently occur in the beginning of the distemper ; for they are occasioned by the rarefaction of the blood in the

X x

small

* Vid. Mauriceau, sur la grossesse & l'accouchement des femmes, Obs. 576.

small vessels; and therefore, by diminishing the heat, are generally more serviceable than detrimental, unless they run to excess.

It happens sometimes, though not often, that the variolous fever is accompanied with a single or double tertian intermitting fever; in which case, the Peruvian bark, or, which is more convenient, its extract, is to be given at proper distances of time, till the paroxysms cease to return. Nor is there any reason to fear, that this medicine will hinder the maturation of the pustules: on the contrary, as this new effervescence of the blood, and commotion of the humours, may easily prove an obstacle to the suppuration; by checking these, all things proceed in their usual course. But first, the body is to be opened by a clyster. Now the case is much the same here with respect to this febrifuge, as in mortifications, in which it is known to be of signal service^d: and it was from a reflection, that mortifications are always accompanied with a fever, that I have proposed the same medicine in the bloody Small-Pox, interspersed with black spots, or in other words, with small gangrenes^e.

Here it may not be improper to lay down one general rule, which is, that whatever acute disease comes upon the Small-Pox, requires to be treated with its own peculiar medicines, and generally bears them very well.

By this time I hope I have thrown sufficient light on the most material circumstances of this part of my subject. But before I close it, it seems well worthy of notice, that this disease is generally very mild, when it is contracted soon after some considerable evacuation, whether natural or artificial. Thus a woman in child-bed has generally a kindly sort of the Small-Pox; if she has recovered somewhat of strength, by the time she is seized with the distemper; and therefore reaps benefit from her late sufferings. The same thing may be said of such as are newly recovered from some acute disease. And I have formerly seen
many

^d Vid. Medical Essays, Edinb. vol. v. part 1. artic. 10.

^e Chap. iii.

many patients in the hospital, who, after salivation for the venereal disease, caught the Small-Pox, while they were yet vastly emaciated; and all of them went through it with great safety; a manifest proof, that any evacuation, by withdrawing fuel from the fire, agrees particularly well with this disease. Lastly, to all that I have hitherto said, this one remark more is proper to be added. Though this be naturally a dreadful disease, yet it is sometimes found to produce very good consequences. For in constitutions, where the blood is vitiated, either from an original taint, or by the manner of living; and glandular tumours are occasioned by the viscidness of the lymph; the Small-Pox, by purifying the juices, contributes to a better state of health for the future.

C H A P. V.

Of the inoculation of the Small-Pox.

THE custom of inoculating, or transferring the Small-Pox from an infected person to one that is sound, has prevailed among us for some years. This matter has drawn our physicians into parties; some approving, and others disapproving this new practice. I shall therefore freely interpose my opinion in the case.

Our nature is so formed, that although we are always inclined to avoid whatsoever may be hurtful; yet, when any evil is to be undergone, which can only be suffered once, this we are impatient to go through, even with a certain boldness: with this view, that the remainder of life may be passed without the uneasiness which arises from the continual apprehension of its coming upon us.

It having therefore been found by experience, that no body was seized with the Small-Pox a second time, and that scarce one in a thousand escaped having it once; men began to consult how the disease might be communicated; it manifestly appearing to be contagious, and it was obvious to conjecture, that the seeds of that contagion lay hidden in the pustules.

But I have often wondered, how such a notion could come into the heads of people almost quite ignorant of what relates to physick. For, as far as I have been able to find out by inquiry, this was the invention of the Circassians, the women of which country are said to excel in beauty; upon which account, it is very common, especially among the poorer sort, to sell young girls for slaves to be carried away into the neighbouring parts. When therefore it was observed, that they, who were seized with this distemper, were in less danger both of their beauty and their life, the younger they were; they contrived this way of infecting the body, that so the merchandize might bring the greater profit. Neither did the thing require the assistance of a physician or surgeon. It was sufficient to make a small wound in the skin, in any part of the body, and put into it a very little of the matter taken out of the ripe pustules; and this even the women had learned to practise^f: in like manner as our artists now, making a very slight incision in each arm, and putting upon it a small thread of lint or cotton, imbibed with the corruption, very rarely frustrate the hopes of their desirous patients.

In process of time, not many years ago, this art began to be used in Constantinople, and Smyrna; not by the Turks, who, imagining all things in life to come to pass by unavoidable fate, think it impious to oppose and resist it; but among the Grecians, Armenians, and the people of other countries living there, who gave the knowledge of it to our countrymen^g.

But

^f See Philosophical Transactions, N^o 339, and 347.

^g See Maitland's Account of inoculating the Small Pox, London, 1722. Et Dissertatio medica de Byzantina variolarum incisione, Auctore Le Duc. Lugd. Bat. 1722.

But that I may omit nothink relating to this affair; a learned author^h has given an account, that the practice of sowing this disease, as they call it, has been known to the Chinese above these hundred years; and that they do it in another manner, which is this. They take the skins of some of the dried pustules, which are fallen from the body, and put them into a porcelain bottle, stopping the mouth of it very close with wax. When they have a mind to infect any one, they make up three or four of these skins, putting between them one grain of musk into a tent with cotton, which they put up the nostrils.

It was indeed not difficult for such ingenious people, when they saw those, who were conversant with the sick, contract the same infection, to guess that the air, tainted with the foul breath of the diseased person did, when drawn in, corrupt one, who was found; and therefore, they might rationally argue, that the same contagious matter might be taken in at the nostrils. Nor were they mistaken in this point.

It is however certain, (whatsoever the author of this narration, more skilled in theological than in medical learning, may say to contrary) that this Chinese way of implanting the distemper is attended with much more danger than the Grecian one. For the morbid particles inspired violently offend the brain, by reason of its nearness to the nerves, which perform the office of smelling; and we have in another place proved, that contagion is propagated, not by the blood, but by the nervous liquorⁱ.

I myself have had an opportunity of making an experiment to this purpose. For, when in the year 1721, by order of his sacred majesty, both for the sake of his own family, and of his subjects, a trial was to be made upon seven condemned malefactors, whether or not the Small-Pox could safely be communicated by inoculation; I easily obtained leave to make the Chinese

^h Vid. Lettres edifiantes & curieuses des Missionnaires, Recueil xx. page 304.

ⁱ Introduction to the mechanical account of Poisons.

nese experiment in one of them. There was among those, who were chosen out to undergo the operation, a young girl of eighteen years of age; I put into her nostrils a tent, wetted with matter, taken out of ripe pustules. The event answered; for she, in like manner with the others, who were infected by incisions made in the skin, fell sick, and recovered; but suffered much more than they did, being, immediately after the poison was received into the nose, miserably tormented with sharp pains in her head, and a fever, which never left her till the eruption of the pustules.

Since that time, this practice has been followed, without much fear, and indeed (as it usually happens in new experiments) sometimes with a degree of rashness; as promising a milder kind of Small-Pox, than when taken in the natural way. For, by the accounts collected by those, who have inquired into the affair, it is plain, that scarce one in a hundred dies by the inoculated Small-Pox; whereas many more in proportion are destroyed by the ordinary disease^{*}.

A remarkable instance of this difference, and with what security this transplanting the distemper may be made, is given in the following relation, communicated to me by a gentleman of great credit. He was a merchant at St. Christopher's, in the West-Indies, and in the making of sugar, (which is the trade of that place) employed a great number of slaves. In one year, when the Small-Pox raged with more than ordinary violence in the neighbouring islands, with his own hands, he inoculated three hundred of them, from five to thirty years of age, with such success, that not one of them died, though most of them were negroes. And whereas all the Americans suffer this distemper in a most terrible manner; yet experience shews, that it is much more dangerous, when it attacks the natives of Africa.

Things

^{*} See Dr. Jurin's Letter to Dr. Cotesworth, containing a comparison between the mortality of the natural Small-Pox, and that by inoculation. And his account of the success of inoculation in the years 1724, 25, and 26.

Things being thus, it may be proper to consider, whether any reasons can be alledged to the contrary. And, in the first place, there are some, who insist upon it, that the eruptions produced by inoculation are not the genuine Small-Pox, and consequently, that they cannot secure any one from having the disease hereafter. Moreover, they take pains to bring testimonies of patients, who, after having undergone the artificial distemper, have nevertheless been afterwards seized with the true one.

Now, I own, I cannot understand how contagion, that is, the very seed of the disease, should produce, not its own proper distemper, but another of a quite different kind. Neither certainly does it matter, by which way the infection is received, provided it brings forth manifest marks of the disease. And as to those, who, after having been inoculated with success, are notwithstanding this, said to have suffered the Small-Pox; I must protest, that, after the most diligent inquiry, I have not been able to find out one convincing proof of this kind. I very well know, that a story is spread abroad, particularly by a late author, of a boy, upon whom, about three years after he had contracted the disease by inoculation, it broke out again. But I am well assured, that this narration is of doubtful credit; and that there were some of the family, who affirmed, that no Small-Pox appeared upon the inoculation; that the parents (as we easily believe what we wish) deceived themselves, and that the by-standers did not care to take away from them this pleasing mistake.

But to speak plainly, if such a thing happened once, why do we not see it come to pass oftener? Or what can a single example, supposing it to be true and certain, avail, when innumerable experiments have produced nothing like it? However, some men are infected with an incurable itch of writing, and take great pleasure in contradicting others, to whom they bear envy. Let us therefore give them leave to applaud themselves, and enjoy their own vain-glory.

But

But they will still go on to terrify us, by saying, that there is danger left, together with the Small-Pox, some other infectious disease, inherent in the blood and humours of the sick person, should be transmitted into the sound body; all contagion being very subtil, and wonderfully active. And it is indeed not improbable, that some other distemper, besides those which are cutaneous, may, by such a way as this, get admittance into the skin; and such perhaps are scrophulous swellings, and the venereal disease. Yet I can hardly believe, that it ever happens, that the seed of one distemper should bring along with it mixed, the procreative matter of another, of a nature quite different from it. However it be, it would be madness in a physician, without any choice, to take the morbid matter for this purpose, out of sick bodies, without distinction. The most proper subjects are infants or children, sound in all other respects, as far as can be judged, and born of healthy parents. Besides, it is, in my opinion, more material, into what kind of a body the venom be infused, than out of what it be taken. And this I the rather mention, because I have more than once known rash and unwary surgeons to implant the disease into bodies weak, and of an ill habit, with a fatal event. Lastly, it is of very great consequence to take care not to throw a new infection into one already infected: for I have observed this to prove mortal; nature being oppressed and sinking under a double disease, when perhaps she might have got the better of either of them single.

I have often considered for what reasons it is, that the inoculated is safer than the natural Small-Pox; and the following seem to be the chief. First, the venom is communicated to a young, healthy, and, for the age, strong body. In the next place, the violence of the fever, which follows, is prevented, if there be occasion, by bleeding, and gentle purging. And lastly, through the whole time, that the contagious matter is exerting its malignity upon the humours (which is generally eight or nine days) quietness, moderation in diet, and every thing else is strictly

observed : whereas, many incur the natural distemper on a sudden, when the blood is heated with wine and exercise ; by which means, all the symptoms must necessarily prove more severe and dangerous. Some have also been of opinion, that the discharge out of the wound made to introduce the purulent matter, and likewise from the small pimples which break out round it, may contribute something to the safety of the patient. But the small quantity which runs out this way cannot, I think, avail much. Two blisters laid, one to an arm, the other to a leg, will certainly do much more ; especially if they be kept running throughout the whole course of the disease. And I make no question, but this practice would be of very great service.

It is proper to mention, that this artificial disease is usually so mild, that it scarce requires any help from medicines. But where it happens otherwise, as it sometimes does, the same will be necessary, which have been directed in the several kinds of the natural Small-Pox.

To conclude ; it ought not to be omitted, that boils, and swellings under the ears, and in the armpits, arise more frequently after the distemper procured by art, than after that which comes of its own accord ; for this reason, as I suppose, that the venomous matter is pushed forward with less force, which disadvantage nature makes amends for this way.

Therefore, all possible means are to be used to ripen such tumors, of whatever kind they are : if this cannot be done, they must be opened by incision ; and when all the matter is drawn out, the body must be purged by proper medicines, which are to be oftener repeated in this, than in the natural disease.

C H A P. VI.

Of the Measles.

THE Measles have a great affinity with the small-pox; being originally bred in the same country, propagated in the same manner, by infection, into distant parts of the world, and never seizing any person more than once.

The history of this disease, as it generally appears among us, Dr. Sydenham has described with his usual accuracy, calling it a fever, which in its nature and method of cure agrees very much with the small-pox; that is, accompanied with a great inflammation, and in which pustules of a particular kind are thrown out upon the skin.

Now this inflammation does not only affect the surface of the body, but the inner parts also, and particularly the lungs: hence follows a cough, with a difficulty of breathing. And although the distemper in its nature be less dangerous than the small-pox, and continues a shorter time; for it usually is ended in six or seven days, or, at the farthest, in eight, very thin, and light scales, like fine flower, falling off from the skin at that time; yet it seizes with more violent heat, and greater anxiety than the other does. Therefore Rhazes observed, that the inflammation of the whole body, the inquietude, and anxiety of mind, are much more terrible in the Measles, than in the small-pox¹.

I have therefore often wondered, why that sagacious and experienced physician, whom I have so often mentioned with praise, did not prescribe bleeding in the very beginning of the disease; but neglected this material part of the cure so far, that he only ordered it at the end, when a hot regimen, and too warm medicines, had brought upon the patient a cough and shortness of breath.

¹ See his book, at the end of this. Chap. i.

breath. Especially since he himself takes notice, that the looseness, which often follows this fever, and which, he says, proceeds from hot vapours from the inflamed blood falling upon the bowels, is only to be cured by blood-letting^m. But the great man deserves pardon upon this account, that in those times, physicians never attempted to take away blood in those fevers, which were attended with any eruptions, particularly in children, who are the most liable to this kind of illness. Their reason was, lest that emptying of vessels should hinder the coming out of what was to be discharged by the skin. But daily experience shews, that this fear is vain, and that the event is quite contrary to what they imagined.

To come therefore to the cure; as this pestilential disease is of kin to the small-pox, it requires a management not very different from the same, which we have recommended in that distemper. Blood must be taken away in the beginning, according to the age and strength of the patient. It is best, if possible, to do this before the eruption of the pustules; but, if they are already come out, it must however be taken away. For the greatest danger is an inflammation of the lungs, which cannot be prevented too soon. Therefore in the height of the fever also, although bleeding was not neglected in the beginning, yet it is sometimes necessary to repeat it. And in the last place, at the end of the disease, when the skin is now growing dry, and the scales falling off, it will be a great error not to open a vein again; that by this means, a flux of humours upon the breast and intestines, and the symptoms of a hec tick fever and consumption, may be happily prevented.

It is really a thing to be grieved at, that physicians, in so great an inflammation of the whole surface of the body, should not always have directed this lessening the quantity, and thereby checking the heat of the blood. And I most of all wonder, that Dr. Morton, who took notice of the necessity of

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this

^m De morbillis, cap. v. p. 207. edit. 1685.

this practice, when the disease was at the highest, should absolutely forbid it in its first appearance. But this physician's judgment was perverted by a vain, and not rightly understood, opinion of a malignity and venom infecting the animal spirits; which had so possessed his mind, that he thought of nothing more, than of throwing into the body hot medicines, called cordials, as auxiliary forces against the supposed enemy. A bad example, and at the same time a convincing proof, how necessary it is, that a man should be instructed in the principles of mechanick philosophy, before he applies himself to the art of physick.

The diet ought to be the same as is prescribed in the small-pox; taking particular care that the body be kept lax, rather than bound up, through the whole course of the distemper.

As to remedies; to those cooling ones, which are directed in the other disease, must be added such as abate the cough, and help expectoration; particularly oily linctus and the pectoral infusion, of which, with the addition of a little nitre, the patient may drink frequently.

Dr. Sydenham gave diacodion, even on the first days of the illness; but I think he was not cautious enough in this point; for all medicines of this kind thicken the humours, streighten the breath, and retard the eruption of the pustules. Therefore, during the increase of the distemper, they are to be used very sparingly; but at the latter end they are of great service: inasmuch as there is then a necessity to quiet the cough, which, from the sharp defluxion upon the lungs, threatens a hec tick fever and consumption. But in the mean time, gentle purges are to be given at due intervals. Milk, especially that of asses, must be drank. Change of air is also necessary. And lastly, exercise, suitable to the strength of the patient, is to be daily enjoyed.

I am afraid, lest I should seem vainly to court applause by the following narration; yet it is so much to the purpose, and so happily confirms what I have said, that I must beg leave to relate it. About forty years ago, the Measles raged with so great violence

violence in this city, that they proved more fatal than even the small-pox. At that time, a physician of great eminence came to me, desiring that I would inform him what method I followed in this disease. I asked him, whether or not he used to take away blood? He answering no, because Sydenham very seldom did it; I advised him to open a vein in the beginning of the distemper, or, if he was called in later, as soon however as he possibly could: for, said I, this disease always brings with it a peripneumony, which he very well knew ever required bleeding. Not long after, he met me again, returning me hearty thanks for my counsel, assuring me, that he had not lost one patient, whom he had treated in this manner. Since that time, this practice grew so common, that it is now followed even by our apothecaries.

In the last place, it is proper to take notice, that, as was observed concerning the small-pox^o, that the disease is more or less rife, according as the season of the year and state of the air conspire with the infection; so the like happens in the Measles. And Dr. Morton relates, that in the year 1672, this distemper was so terrible, that in London there died of it three hundred every week^p.

But I have at last finished this little work: which though it may perhaps, to contentious and malevolent persons give matter for calumny and finding fault; yet will, I hope, prove beneficial to mankind, especially to our own countrymen. This is all I desire; for the consciousness of having done right is beyond all praise, carrying with it its own reward: and this he always enjoys, who consults the publick good, and by his actions shews, that he thinks he is

Not for himself, but for the whole world born^q.

^o Chap. ii.

^p Append. ad Exer. de morbis acutis, pag. 427.

^q Non sibi, sed toti genitum se credere mundo.

Lucan. l. ii. v. 383.

R H A Z E S's
T R E A T I S E
ON THE
S M A L L - P O X
A N D
M E A S L E S.

P R E F A C E.

In the name of God, merciful and gracious.

ABU-BEKER MOHAMMED, the son of Zacharias, saith thus:

On a certain night, at a meeting in the house of a nobleman, of great goodness and virtue, and very fond of the explanation of useful sciences, that they might be made plain and intelligible for the publick benefit; the conversation having turned on the Small-Pox, I then spoke what came into my mind on that subject. Which, when that great man (whom may God long preserve for the good of mankind) had heard; he desired, that I would write a discourse on that disease with sufficient aptness, solidity, and clearness: because there had never yet been published, either by the antients or moderns, a satisfactory account of it.

I therefore composed this treatise, hoping to receive my reward from the almighty and glorious God, as the effect of his good will.

Now this is the sum of its contents, and the heads of the chapters.

C H A P. I.

Of the causes of the Small-Pox; and how it comes to pass, that no mortal, except by chance here and there one, escapes free from this disease.

C H A P. II.

What bodies are most disposed to the Small-Pox: also of the seasons of the year, in which they most frequently happen.

C H A P. III.

Of the prognostick signs of the eruption of the Small-Pox and Measles.

C H A P. IV.

Of the regimen, or cure of the Small-Pox, in general.

C H A P. V.

Of preservation from the Small-Pox before the signs of them appear; and the way to hinder the multiplying of them after the signs have appeared.

C H A P. VI.

Of those things, which hasten the eruption of the Small-Pox: also how nature is to be assisted therein.

C H A P.

C H A P. VII.

Of taking care of the eyes, throat, ears, and joints, as soon as the signs of the Small-Pox have appeared.

C H A P. VIII.

Of ripening the pustules.

C H A P. IX.

Of drying the pustules.

C H A P. X.

Of taking away the dry scabs of the Small-Pox, and the eschars from the eyes, and the rest of the body.

C H A P. XI.

Of destroying the marks of the Small-Pox.

C H A P. XII.

Of the food and diet in the Small-Pox.

C H A P. XIII.

Of managing the discharges of the belly, in the Small-Pox.

C H A P. XIV.

Of the curable and incurable Small-Pox and Measles.

R H A Z E S's
 T R E A T I S E
 ON THE
 S M A L L - P O X
 A N D
 M E A S L E S.
 C H A P. I.

Of the causes of the Small-Pox ; and how it comes to pass, that no mortal, except by chance here and there one, escapes from this disease : also a brief account of what Galen has mentioned concerning it.

AS to those physicians, who affirm, that the most excellent Galen has made no mention of the Small-Pox, and therefore that he did not know this distemper ; surely they have either never read his works at all, or only very cursorily ; nay, most of them do not know, whether what he plainly says of it, is to be under-

understood of that disease. For Galen, in a certain treatise, says, this * * does good this and that way, and also against the Small-Pox. And in the beginning of the fourteenth book Of Pulses, that the blood is putrefied in an extraordinary degree, and that the inflammation runs so high, that it burns the skin; so that the Small-Pox, and pestilent carbuncle, are bred in it, and quite consume it.

And in the ninth treatise of the book Of the use of the parts, he observes, that the superfluous parts of aliments, which are not turned into blood, and remain in the members, putrefy, and in time increasing do ferment; whence, at last, are generated the pestilential carbuncle, the Small-Pox, and confluent inflammations.

Lastly, in the fourth part of his Commentary upon the Timæus of Plato, he says, that the ancients gave the name φλεγμονή to every thing, which produces redness, as the carbuncle, and Small-Pox; and that these diseases are bred in those, in whom bile abounds.

But as for those, who alledge, that he has proposed no remedy or cure, nor explained the nature of this distemper, they indeed say what is true: for he mentions no more than what we have cited. But God knows, whether he might not have done it in some other books, which have not yet appeared in Arabic.

As for my own part, I have with great diligence inquired of those, who understand both the Syriac and Greek language, and desired them to inform me concerning this matter: but not one of them could tell me more than what I have set down. But this indeed I very much wonder at, and why he passed over this distemper in silence; especially since it was frequent in his time, and therefore there was great reason for his prescribing remedies against it, as he was so diligent in finding out the causes and cures of diseases.

The moderns have, it is true, proposed some medicines for the cure of the Small-Pox, but not distinctly and clearly enough; neither

neither has any one of them explained the cause of it, and why, except here and there one, no body escapes it; nor shewed the methods of cure in a right order. Upon which account, I hope that the good man, who encouraged me to undertake this work, will have his recompence; and that my reward will be doubled, when I shall have described whatever is necessary to the cure of this disease in due method, assigning to every thing its proper place; by the help of God.

Wherefore let us begin to recite the efficient cause of this distemper; and why it happens, that scarcely any one mortal escapes it. And then we will pursue separately, in the subsequent chapters, the other things, which relate to it; and, with God's assistance, shall say on each head whatever is necessary for its cure.

I say then^a, that the body of man, from the time of his nativity, till he arrives at old age, continually tends to dryness; and that therefore the blood of infants and children, and, in proportion, the blood of young men, abounds much more with humidity, than the blood of old men, and is also hotter. And this indeed Galen teaches us, in his Commentaries upon the Aphorisms, where he says: the heat of children is indeed greater in quantity, than the heat of young men; but the heat of young men is more violent in quality. This also is evident from the force of their natural actions, as the digestion of their food, and accretion in children.

Therefore, the blood of children may be compared to new wine, in which the fermentation leading to ripeness is not yet begun: and the blood of young men to the same, fermenting and emitting steams, till it is quiet and ripe. And, lastly, the blood of old men is like to wine, whose strength is gone, so that it becomes vapid, and begins to grow sour.

Now, the Small-Pox arises, when the blood putrefies and ferments, and the fermenting particles are thrown out of it; the
blood

^a Here begins the translation of the anonymous Greek interpreter.

blood of children, like to new wine, being changed to that of young men, which is as wine perfectly ripened. And this fermentation and ebullition is the disease.

And this is the reason why children, especially males, rarely escape being seized with it. For, without doubt, as the wine naturally ferments till it comes to perfection; so the blood undergoes the same alteration, in passing from its first to its second state. And there seldom happens a temperament in an infant or child, in which such a change can be made in a small time, and without manifest signs of it: as may be judged from their diet, which in infants is milk; and in children, not milky, but their food is stronger, in proportion, than that of other ages, and more compounded. To which it may be added, that in these there is, after food, a greater motion of the humours. For these reasons, very few children go into life without this distemper. Besides this, great alterations are made here, by different temperaments, manners of life, and habits; as also, by the constitution of the ambient air, and state of the blood, both as to quantity and quality: for in some this flows quicker, in others slower; in some it abounds, in others it is deficient; in some it is very bad, in others in a better condition.

As to young men, whereas the change in their blood is already made, its maturation finished, and the particles of moisture, which should cause putrefaction, are now exhaled; hence it follows, that this disease cannot be generated in them, at least but very seldom, that is, in such, whose blood still abounds with too much humidity, or is very corrupt, with a violent inflammation; or who, perhaps, when they were children, had been attacked with the chicken-pox, when their blood had not yet passed from the first state to the second; or, lastly, who have a moderate heat, that is, without much moisture; and when they had the chicken-pox, were of a dry temperament, and lean.

In an advanced age, the distemper will scarcely appear, unless perhaps in putrid, malignant, and pestilential constitutions of the

air, in which this disease chiefly rages. For such an air disposes bodies very much to heat and moisture; and an inflamed air promotes eruptions, by blowing up the spirit in the ventricles of the heart, and communicating to it the like disposition, which, by the force of the heart, is sent into the blood, which is in the arteries; and brings it into the same state of corruption.

Thus we have sufficiently, though succinctly, treated of the causes of the Small-Pox. We shall now proceed to shew, what bodies are most disposed to this disease and the Measles.

C H A P. II.

Of bodies disposed to the Small-Pox.

BODIES inclined to this disease are generally such, as are moist, pale, and fleshy; the well-coloured also, especially, if they are ruddy and tending to brown, are disposed to it, if they are loaded with flesh. So are likewise those, who are frequently liable to acute and continual fevers, to running of the eyes, red pimples, and boils, proceeding from the eating of sweet things; as dates, honey, figs, grapes, and all those sweets, in which there is a gross humour; particularly, thick gruels, food made of unground wheat, with honey and water, or a great quantity of wine and milk.

Lean, bilious, hot, and dry bodies are more inclinable to the Measles, than to the Small-Pox. But if they happen to be taken with the Small-Pox, the pustules are either few, distinct, and favourable; or, on the contrary, very bad, irregular, deceitful, dry, with putrefaction, and no maturation.

Lastly, thin and dry bodies, of a cold temperament, are neither subject to the Small-Pox, nor to the Measles. And if they happen to catch the Small-Pox, they have but few, in a moderate

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way, and without danger, with a very slight fever; because such constitutions extinguish the disease in its very beginning.

The seasons of the year, in which the Small-Pox are most frequent, are various: they rage most at the latter end of the autumn, and the beginning of the spring; and when in the summer there are great and frequent rains, with continual south winds; and lastly, when the winter is warm, and the winds southerly.

When the summer is excessively hot and dry, and succeeded by a hot autumn, in which rains come on very late; then the Measles quickly seize those, who are disposed to them, that is, those who are lean, hot, and of bilious constitutions.

But all these things admit of great differences, by reason of the diversity of countries and places, and occult dispositions in the air, which bring on those distempers, and render bodies subject to them. And therefore at such times, great diligence is to be used in the preservation from them; as we shall shew in the sequel.

C H A P. III.

Of the prognostick signs of the eruption of the Small-Pox and Measles.

THE eruption of the Small-Pox is preceded by a continual fever, a pain in the back, itching in the nose, and terrors in sleep. These are the proper signs of the approaching Small-Pox, especially the pain in the back, with a fever; and also a pricking, which the patient feels all over his body; together with a fulness and redness of the face, which at times goes and comes: a redness of the eyes, a heaviness of the whole body; frequent yawnings, a pain in the throat and breast, with a difficulty

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culty in breathing, and streightness in the gullet; then a dryness of the mouth, thick spittle, a hoarseness of the voice; head-ach, anxiety of mind, inquietude; sick qualms and heaviness of heart, oppress more in the Measles, than in the Small-Pox, unless the Small-Pox be of a bad sort; for the Measles are from a very bilious blood. And, on the other hand, the pain in the back, the heat and inflammation of the whole body, especially in the throat, with a shining redness, are more proper to the Small-Pox than to the Measles.

Wherefore, upon the appearance of these signs, or some of the worst of them, you may be assured, that one or the other of these diseases is nigh at hand.

As to the safer kind of the Small-Pox; in these, the quantity of blood is greater than its bad quality: and hence arises the pain of the back; the greater blood-vessels, which are situated near the vertebræ of the back, being distended with too great a quantity of blood.

C H A P. IV.

Of the regimen, or cure of the Small-Pox in general.

THE first article shall be of the preservation to be used, before the signs of the Small-Pox appear; and after they have appeared, how the disease may be lessened.

The second, concerning the eruption.

The third, the care to be taken of the eyes, ears, nose, throat, and joints.

The fourth, of the ripening of the pustules.

The fifth, of their drying.

The sixth, how the scales and crusts are to be cleared from the eyes, and the rest of the body.

The seventh, of destroying the marks.

The eighth, of the diet in the Small-Pox.

The ninth, of regulating the discharge by the intestines.

The tenth, of curable and incurable Small-Pox and Measles.

Of each of these I shall, God willing, briefly, but sufficiently, discourse.

C H A P. V.

Of preservation from, and lessening the disease.

BLOOD ought to be taken away from children and young men, if they have never had the Small-Pox, or have only had what is called the chicken-pox (especially at such seasons as we have above described) before they are seized with a fever, and the signs of the disease appear. A vein may be opened in those, who are fourteen years old; to those who are younger, cupping-glasses must be applied, and their lodgings should be kept cool.

Let their diet be yellow lentils, tarts made of unripe grapes, minced flesh-meat, dressed with vinegar and honey, or with the acid syrup; to which raisins, a few figs, and chiches are sometimes added: also kid-broth, veal-jellies, and boiled wood-cocks and hens. But these must be mixed with the juice of unripe grapes.

Their drink should be water cooled with snow, or clear spring water cold; with which their chamber may also be sprinkled.

Let them frequently eat acid pomegranates, and the inspissated juices of acid and astringent fruits, as pomegranates, currants^b, and the like.

Where

^b The Arabic word is Ribas, which also signifies a sort of lapathum acetosum, or forrel, of which the red and acid juice boiled to two thirds, is called Rob de Ribes. See Golii Lexic.

Where the constitution is hot, and there is a great inflammation; barley-water, with a fourth part of acid pomegranate juice, may be drank in the morning. But if the heat be less, a ptyfan of barley, with sugar, is proper; and vinegar, lentils, pomegranates, and the juice of unripe grapes, may be added to the food; for all these thicken and cool the blood, and make the distemper more mild.

This regimen is of great service in all times of pestilence; for it diminishes the malignity of pestilential ulcers and boils; and prevents quinsys, pleurisy, and all distempers arising from bile and blood.

The patient may go into cold water, and swim in it about noon. He must abstain from new milk, wine, dates, honey, and, in general, from sweet things, and meats, made by a mixture of flesh, onions, oil, butter, and cheese; from mutton, beef, shellfish, high-seasoned things, and hot seeds. Instead of these, in times of contagion, he may eat young birds; and if the temperament be hot and moist, liable to putrefaction, or hot and dry, and apt to be inflamed; he must eat as follows; that is, in the hot and dry constitution, cooling and moist garden-herbs, purslain, mallows, beet, gourds, cucumbers, sorrel, and small pompions.

As to sweet melons, they are forbidden; and if any one by chance eats of them, he must presently drink a spoonful of the juice of some of the acid fruits. He may be allowed soft fish, and butter-milk.

To the food of those, who are corpulent, fleshy, and of a ruddy complexion, such cooling and drying things, as we have mentioned, may be added. They should all forbear labour, fatigue, bathing, venery, walking or riding in the sun and dust, drinking of stagnating waters, blasted fruits, or mouldy herbs; and also figs and grapes: because these drive the humours to the skin, and, filling the blood with flatulent spirits, dispose it more to fermentation and ebullition. Their body must be opened, if
there.

there be occasion, with the juice of prunes and sugar, or with whey and sugar. If the air be putrid and pestilential, their face may be continually sprinkled with the water of sanders and camphire; which, if it pleases God, will have a good effect.

As to sucking infants; if they are fat and ruddy, and above five months old, let them be cupped; and let the nurse, as far as possible, be managed in the manner we have mentioned.

I come now to those medicines, which thicken and cool the blood, and check its ebullition and putrefaction.

All acid things are proper for this purpose, especially the water called al-râib, that is, the sour, bitter water, which swims upon butter-milk exposed to the sun; and the acid juice of citrons.

The same intention is very well answered by many things, which have an astringency joined with their acidity, and thereby condense the blood. Such are, sour grapes, fumac, rob ribas, or the inspissated juice of currants, apples, quinces, and pomegranates; jujubes, lentils, coleworts, coriander, lettuce, poppies, endive, night-shade, sugar called bambu^c, the seeds of fleawort, and camphire.

The following composition is good to cool the blood, and restrain the heat of the liver, and effervescence of the bile.

Take of red roses beaten, ten drachms; bambu-sugar, twenty drachms; fumac, the seeds of wild sorrel, lentils peeled, berries, the seeds of purslain, seeds of white lettuce, of each five drachms; red sanders, two drachms and a half; camphire, one drachm.

Let these be mixed, and give three drachms of this powder to the patient every morning in his drink, together with an ounce of the juice of wild sorrel, or of ribas, pomegranate, or unripe grapes, and the like.

The medicine al-sacangjabin, that is, oxymel with sugar, is likewise good, which is thus prepared.

Take

^c The Indian name for a concreted juice, like sugar, in an Indian reed.

Take one part of red, sharp vinegar, depurated; two parts of rose-water; mix, and infuse in the cold mixture, one ounce of red roses; half an ounce of balauftines; two ounces of pomegranate-peel, for the space of three days. Then strain the liquor, adding to it, according to the quantity of the vinegar, twice or thrice as much of the sugar tabarзад, that is, white sugar-candy. Boil it sufficiently, and use it.

It will also be of use to take of roses and bambu-sugar, of each ten drachms; white sanders, three drachms; camphire, one drachm; and moisten them with the mucilage of the seeds of fleawort; then make the mass into pills, or troches. Of these, at proper times, three drachms may be given in the patient's drink, together with one ounce of the aforesaid al-facangjabin.

Besides these, the following syrup is excellent, and wonderfully exceeds in virtue all others, which I have seen tried; though perhaps the syrup of pearls, which the Indians describe, and of which they boast more than they can have experienced, may be more powerful. For they say, that if any one drinks of that syrup, though nine pustules have already appeared, there will not come out a tenth.

Now the composition of mine is this.

Take of red vinegar depurated, old, and sharp, three pounds; of the juice of acid pomegranates, the acid juice of citrons, the juice of unripe grapes, of ribas, of the Syrian mulberries, the expression of Syrian fumac, and berberies, of each one pound; the juices of lettuce and tarragon, of each a quarter of a pound; of the decoction of red jujubes, and the infusion of lentils, each a pound and half. Mix all together, and add three pounds of sugar; boil the whole, and put to it some of the syrup already made, hot, working it with a pestil, till it is dissolved: then mix it with the whole, stirring it continually with a stick of camphire wood; throw it into a mortar of stone, or willow-tree wood, taking out the clearest part all the while; having added and mixed bambu-sugar and camphire. Use this before the

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Small-Pox appears, and also after the appearance, as we shall direct anon. It is also proper in all distempers, which arise from a bilious blood, in pestilential ulcers, boils, quinsys, and the like.

What I have said may in general suffice concerning preservation from the Small-Pox, before the fever, which attends their signs, comes on.

The last mentioned syrup repels the disease from one, who is in such a condition, that it can be repelled; so that what comes out will be very moderate. It also effects, that the change of the blood from the first state to the second, should not be done too hastily, and at once, with too great ebullition, and frightful and dangerous symptoms; but by degrees, and in a longer time; in the way of maturation, not putrefaction, without terrible and dangerous fevers.

But when the fever, which accompanies the eruption, arises, this regimen is no longer to be used, unless with great caution and prudence; for a mistake here is very dangerous, for this reason, that while the blood is rarefied, and nature according to the temperament of the patient, is endeavouring to expel the morbid matter; if then the refrigeration and condensation, which you intend, does not exceed the cool state the patient was in before, it will happen, that the ebullition will break out a second or third time; and thus nature will be disturbed in her work. Neither can that ebullition be checked, without great danger; for those remedies must be used for this purpose, which do in a manner congeal and coagulate the blood; such are, opium, hemlock, a great quantity of juice of lettuce, nightshade, and the like. And the congelation of the blood, and extinction of natural heat, by all these, is not safe; because of the excess, which is easily committed: for it will be hard, at the same time to repress the effervescence, and preserve the due natural heat. In one word, care must be taken, not to extinguish preternatural and natural heat together.

Now

Now I shall communicate a practice, which physicians, either through ignorance or avarice, that they only may receive profit from it, usually conceal; and it is this. When you observe, upon the signs of the disease, a distension of the belly, pain in the back, redness of the face and eyes, a violent head-ach, with a full pulse, and also a straightness of breath, a red and turbid urine, and such a heat of the body, as a man feels, who has been for some time in a hot bath; especially, if the body be fleshy; there is then all the reason in the world to take away blood. Wherefore, draw away a good quantity, even till the patient faints away. It will be best to do it from the basilick vein, or some of its branches; but if that cannot be found, from the cephalick vein. Sometimes, when the basilick does not appear, it may be taken away from the vein in the ankle; but better from the basilick or its branches, because they draw from the greater veins in the abdomen more than the cephalick does.

If the symptoms do not run very high, although they are manifest, draw blood but sparingly; and when they are less, take away very little. Then proceed in the cure with repelling medicines, as has been mentioned.

If by these the feverish heat is removed, and the pulse and breath are come to their natural state; still insist on the use of them, till the heat of the disease is perfectly abated, which will be done in a short time.

In order more effectually to perform this extinction, let the patient drink water, made cold in snow to the highest degree, very plentifully and often; so that he may feel the coldness of it in his bowels. If, after this, the fever and burning return, give this water, a second time, two or three pints, or more, in the space of half an hour.

If still the heat return, and the belly be full of water, make him vomit it up, and then give it again. And if the water finds a passage, either by sweats or urine, you may be assured the patient is in a good way.

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But if the water does not pass, and the heat returns as it was at first, or even is more violent; omit giving the water so often, and have recourse to the other extingvents, which have been described; and if the patient finds relief, persist in the use of them. If, on the contrary, you perceive, that they produce an intolerable uneasiness and inquietude, you may certainly know, that the eruption of the Small-Pox or Measles is at hand. Wherefore you must quit this method, and hasten to assist nature, in expelling her superfluities, in the manner I shall deliver in the following chapter.

C H A P. VI.

Of those things, which hasten the eruption of the Small-Pox.

THE eruption of the Small-Pox and Measles is promoted by the following means. The patient must be well wrapped up in clothes, and his body rubbed all over. He must be kept in a room not very cold; he should drink frequently, a little at a time, of cold water; to provoke sweat, and assist the protrusion of the humours to the external parts.

The sick person must put on a double shirt, the borders of which must be bound. Underneath him, place two small basins of very hot water, one before, and the other behind him; so that the vapour may come to the whole body, except the face; by which means the skin will be rarefied, and disposed to receive the erumpent humour. For the surface of the body may, in this case, be compared to a leech, which, to cool its own heat, attracts whatsoever it can. And by this management, not only

is the skin softened, but the strength of the patient is also preserved: so that nothing can be more proper.

As to furnaces and baths, they are both destructive at this time, by so over-heating and weakening, that a swooning follows; by which nature is diverted from its work with great danger, if the fit be violent and long: for nothing is a greater indication of the approach of death, the natural heat retiring into the inner parts; after which it will be soon oppressed and extinguished by the over-abounding humours. Likewise, when the hot vapour, which I have directed, is used, it must never be suffered to cool upon the body; but is presently to be wiped and dried off, with great diligence. This method is abundantly sufficient to forward the coming out of the disease, when nature is not languid, or the humours too thick and viscid.

But in case it happens, that the outward fever is indeed mild, but anxiety and inquietude continue, and the eruption is difficult; you must wait till the fifth day is over, and then use those medicines which promote the eruption. But this is to be done with great caution, and all manner of attention, in the way which I have mentioned, when speaking of the rules to be observed in giving extinguishing remedies: for an error here, although it be not so great as the other, yet is also dangerous. And the caution consists in not being too hasty in giving these medicines, but to insist upon the former regimen, as long as there is any prospect of success without them; and as long as you are not yet certain, that the fever is too remiss in the inward parts, as well as it is in the outward. This you will easily know, by the pulse and respiration not being too quick, full, or irregular; and if, in feeling the breast, you do not find it hot in the highest degree. For though the fever be doubly or trebly increased, it will not therefore be mortal; as you may judge by comparing this with other fevers, which you have observed in persons of the same temperament, and in the same degree of heat with your patient, who nevertheless have recovered.

These extinguishing remedies are also to be applied, when, as soon as the pustules appear in the skin, the patient feels himself to be pretty well, and his pulse and breath are easy. But if, on the other hand, the eruption goes on slowly and with difficulty, they must be absolutely forborne: for to use them, is to strive against nature, and check the protrusion. And when any anxiety follows upon the use of extingvents, especially a palpitation of the heart, be sure that you have committed a great error. You must therefore immediately take all possible pains in softening the skin, in the manner I have taught; and give to drink frequently warm water, either alone, or in which fennel and smallage-seeds have been first boiled, and the like simples, which conduce to the eruption; according as the heat of the patient, and his stomach will bear them; regard also being had to the slowness of the pimples in coming out.

This is the description of an easy, gentle medicine, which, without too much heat, promotes the eruption.

Take yellow figs to the number of thirty; raisins, the stones being taken out, twenty drachms; pour upon them three pints of water, and let them boil till they are dissolved. Give to the patient of this liquor half a pint, at three several times. Then cover him up well in clothes, and foment the body, as is above directed.

The following is yet more powerful.

Take of the aforesaid decoction four ounces; of the decoction of fennel and smallage-seeds, two ounces; let the patient drink it, as has been directed.

One still more efficacious is this.

Boil fennel-seeds and smallage-seeds, of each ten drachms, in an earthen vessel, till the water is red; strain it, and give three ounces at a time.

Lastly, this composition is very good and useful, at several times.

Take of red roses four drachms; of lentils decorticated nine drachms; yellow figs ten; of gum tragacanth three drachms;
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of white raisins stoned, ten drachms ; lack, cleared from its sticks, and washed, three drachms ; fennel and smallage-seeds, of each five drachms. Boil all these in three pints of water, to one pint : strain the liquor, and give half a pint of it, with a sixth part of a drachm of saffron, twice or thrice, as there may be occasion.

We shall now speak of those parts of the body, of which care is to be taken.

C H A P. VII.

Of taking care of the throat, eyes, &c. as soon as the pustules have appeared.

As soon as ever the signs of the Small-Pox appear, particular care must be taken of the eyes, the throat, the nose, and ears, and also of the limbs, in the way I am going to describe. Nay, sometimes it will be necessary to extend our care even to the soles of the feet, and the palms of the hands : for oftentimes violent pains arise in these parts, the hardness of the skin hindering the eruption.

Upon the first appearance of the signs, drop rose-water into the eyes now and then ; also wash the face with cold water often in a day, and sprinkle the eyes with the same. For if the disease be mild, this method will prevent the pustules breaking out in them. This indeed is to be done, for greater caution ; for in the mild sort, it seldom happens, that any pustules break out on the eyes. But in a bad sort, when you see a large eruption in the beginning, with an itching of the eye-lids, and redness of the white of the eyes, some places of which are redder than others ; you may be assured that the Small-Pox will break out there, unless
great

great help be given : therefore immediately drop rose-water, in which fumack has been infused, into the eyes, several times in the day.

It will be still more effectual to apply a collyrium, made of galls in rose-water, by dropping it into the eyes ; or to instil into the eyes what is squeezed from the pulp and skins of the four pomegranate, first chewed. Then wash the eye-lids with a collyrium, made of the water of quinces, the juice of unripe grapes, boxthorn, aloe, and acacia : of each of these let there be one part, and a tenth part of saffron ; and drop some of it into the eyes.

But if you observe a turgescence in the humours, and the eruption to be very copious, so that pustules will certainly fall upon the eyes, because redness appears here and there in their white part, from the excess of the inflammation ; and also find, that what you have applied does not remove that redness, but only lessen it for a time ; after which it returns more violently than before, or at least continues as it was, when you began this treatment ; you must not proceed any longer in this method, but, instead of these things, drop into the eyes some of the acid liquor expressed from mouldy bread, with the Nabathæan bitter, in which there is no vinegar, or other acid.

As to the pustules, which break out in the tunica cornea of the eye, these darken the sight, and are to be cured, according to the degree of their thickness, by such dissolving remedies, as I am going to describe : which indeed are sometimes effectual, and sometimes not ; the success depending upon the matter being more or less thick, and upon the greater or less firmness and dryness of the body.

But if large pustules shew themselves in the tunica uvea, use the collyrium of rose-water several times in the day and night, with great diligence ; or else that before-mentioned, leaving out the saffron ; instead of which, put a small quantity of blood-stone, to keep down the swelling.

These

These things are what ought to be known concerning the eyes. Care is next to be taken of the throat and mouth, lest any eruption there should grieve the patient, and hinder his breathing; for it often happens, that in a bad kind of the disease, terrible suffocations are brought on, which leave no hopes of a recovery.

Therefore, on the first appearance of the signs of the Small-Pox, let the mouth be gargled with the water of acid pomegranates, or of sumack, or with the juice of mulberries, or with some of those things, which we have recommended, (Chap. V.) under the head of extinguent remedies; or lastly, if nothing else be ready at hand, with pure cold water; and that very often, to prevent a great eruption into the throat and mouth, and strengthen those parts, or at least hinder what is already broken out there from causing a suffocation. Be quick therefore, and diligent in applying this cure, especially, if from a hoarseness of voice, straightness in breathing, and a pain in the throat, a necessity of it shall appear.

Moreover, if the strength will bear it, take away blood from the cephalick vein; and that even after the whole eruption is over. And if the patient find any thing in his mouth, or throat, which hurts him; and yet there is not too great a heat there, neither are his bowels too loose, let him lick by degrees of fresh butter mixed with white sugar-candy. But if there be any heat and inflammation there, give a linctus of this kind.

Take of sweet almonds decorticated one part; of the seeds of gourd two parts; of white sugar-candy three parts; the mucilages of the seeds of fleawort, and of laurel-berries; a linctus of gum-arabick, almonds peeled, and the seeds of the plane-tree, and wheat-flower: mix all these with a mucilage of quince-seeds.

In the next place, let us take care of the limbs: for upon these a number of very bad pustules often arise, which corrupt them to such a degree, that the muscles, tendons, nerves, and the bones

bones themselves lie bare. Assist therefore immediately, if you observe the signs of the disease to be violent and excessive; that is, bathe the limbs with sanders, quince-water, Armenian bole, roses, camphire, vinegar, and rose-water: but take care not to overdo it. If the pustules are very large, open them with an incision-knife, to let out the matter: and delay not this operation; for the case is dangerous.

Now let us come to the cure of the nose and ears, lest they should be over-filled with the pimples: for this will greatly afflict the patient; and when they break out in the internal part of the ear, there is danger of their coming presently into the nose. Take therefore a cotton cloth, upon which camphire has been broken; by the help of this, put into the ear fragrant wine-vinegar, to which has been added quince-water, or the juice of boxthorn. Do this in the morning, and repeat it twice or thrice a day.

Lastly, if a great pain arises in the soles of the feet, prepare instantly to anoint them with warm oil, and foment them with warm water and cotton. If this does not assuage the pain, nor facilitate the eruption, beat up decorticated sesam with milk; anoint with it, and bind it on with cloths, and leave it upon the part all night. In the morning, put the foot into warm water; and repeat the same again. Or bruise dates with butter, and apply them; or, lastly, anoint with the lees of the sesamine-oil. For, these, and the like things, soften and relax the skin; and by this means diminish the pain, and promote the eruption.

C H A P. VIII.

Of ripening the Small-Pox.

WHEN, after the eruption is completed, you observe the pustules tend too slowly to maturity, and yet that the patient is otherwise in a very good way, as to his respiration and pulse,

pulse, and pretty free from inquietude and anxiety ; then it behoves you, to assist the maturation of the pustules.

But if, together with a backwardness of ripening after the eruption, you perceive the pustules to become hard and warty, and the patient not at all better ; or if his illness increases ; then you are to know that the Small-Pox is mortal. Wherefore, have no thoughts of ripening the pustules ; for they are of that kind which cannot be ripened.

Now, the maturation of the Small-Pox, if curable, is to be effected by fomenting the body with the steam of a hot decoction in water of camomile, violets, melilot, marsh-mallows, and bran, either separate, or collected together in two basons ; as we have directed above, where we treated of facilitating the eruption.

And if then the patient seems to find relief and refreshment by the fomentation, you are to abstain from those fumigations, which are commonly employed for drying up the pustules ; until they ripen of themselves, and are capable of bearing those things, which contribute towards drying them up : of which we are now going to treat.

C H A P. IX.

Of drying the pustules.

IF the pustules are large and very numerous, they must be dried ; or the fluid contained in them must be soaked up with fine clean cotton, in which there is nothing that may hurt the patient. And then let fumigations be made with the leaves of dried roses, or with the leaves of the storax-tree, or with sanders, or with the leaves of the iris, or the tamarisk : and indeed roses are more convenient in summer, but tamarisks in winter.

The Small-Pox sometimes abounds with too much moisture. When that happens, order the patient to lie on pounded roses, or on rice-meal, or on millet-meal, with which a mattrafs of a thin texture is stuffed.

If the body be full of pustules, lay moist leaves of the iris under the patient; and besprinkle him with an aromack powder made of aloe, frankincense, sarcocol, and dragon's blood.

But if the pustules break spontaneously, or from the quantity of the fluid contained in them, and are slow in drying, treat them in this manner.

Take of sesamine-oil one ounce; of Andarene^d salt pounded fine, and of alum, each two drachms. With this liniment anoint the body, carefully avoiding those places which are ulcerated or excoriated, or even too near an approach to them; because the medicine would raise a violent inflammation. Let the liniment lie on the parts for the space of an hour; then wash it off with a decoction in water of emblick myrobalans, white tamarisk-berries, myrtle-leaves, and pomegranate-peels.

If the pustules are dried by these means, it is well; if not, take the whitest sort of bole (not the red bole) add to it of Andarene salt, and of dry bread crumbled fine, each a tenth part. Make a liniment, with which rub the skin; let it lie on for an hour or two, and then wash it off.

Now we are to treat of taking off the dried scales, and crusts, or escars.

^d Andar is a village, a mile distant from Aleppo, where a very white fossil salt is found. See Maundrell's journey.

C H A P. X.

Of taking away the dry scabs and escars.

WHEN the Small-Pox is withered, and the dry scales and escars still remain on the skin, examine them well; and to those that are small, and thoroughly dried up, apply warm sesamine oil every now and then, till they are softened, and fall off: but those of the face are to be managed with oil of pistaches. For the larger sort, which resemble escars, if you find any moisture remaining in them, cut them off carefully, without any application of oil. And if the places, from whence you have removed the escars, contain but little moisture, it is to be dried up with soft cotton, as I have already said: but if they contain much, they are to be dried gradually; besprinkling them with the red aromattick powder, composed of aloe, frankincense, sarcocol, and dragon's blood, especially if they begin to lessen, and sink in; and with alum and Andarene salt, if they are even with the rest of the surface of the body, and do not sink in: then wait till a new eschar or scab is formed on them. If there be any return of moisture, repeat the same dressings. And in fine, when the moisture is entirely exhausted, then anoint the parts with oil, until the crusts are softened, and all fallen off.

Next follows a discourse on destroying the marks of the Small-Pox.

C H A P. XI.

Of destroying the marks of the Small-Pox.

THE marks of the Small-Pox are of two sorts: for they are either in the eye, or on the rest of the body. Now with respect to the eye, the part on which the Small-Pox broke out, has an opaque whiteness in it, as we have already observed. If this happens in the eyes of children, or young persons of a moist constitution of body, and tender skin, it will be the more easily deterged.

Now the medicines, which deterge the eye, and take off the whiteness, are these: borax, or nitre made into cakes, Andarene salt, sal-ammoniack, glass, the scorix of glass, coral, tutty, lapis hæmatites, verdigrease; bastard sponge, the sea crab, the dungs or excrements of sparrows, swallows, starlings, mice, bats, and of the Arabian or Lybian lizard; musk, the sediment of urine; the acorus, ebony, cornel-water, Arabian sugar, dregs of vinegar burnt, myrrh, sandaracha or juniper gum, commonly called varnish, gums of the olive and bitter almond-trees, and the milky juice of wild lettuce. It will be best to use these, when the patient is just come out of the bath, or after holding his head over the steam of hot water. But mild medicines alone, nay the mildest of these, are to be employed, especially in soft and moist bodies.

The description of a mild medicine, which removes the white specks from the eye.

Let the eye be sprinkled with sarcocol, and white sugar-candy.

Another more efficacious.

Let the eye be sprinkled with bastard sponge, sarcocol, and sugar.

Another.

Another still more powerful.

Take of verdigrease ten drachms ; myrrh, fagapenum, sal-ammoniack, sarcocol, of each two drachms and a half ; bastard sponge, scorix of glass, and borax, or nitre in cakes, of each three drachms. Then take of sweet cane ten drachms, and the same quantity of colnel-water. Boil these in ten times the weight of water, till the decoction becomes thick : then dissolve the gums in it, and mix all well together into an ophthalmick collyrium. Afterwards, as occasion shall require, to this mixture add ebony in an oil-bottle. Cleanse the part affected gently and often with a needle or style ; taking care to apply the collyrium frequently, both before and after the operation. And lastly, sprinkle it with the powder of the milder sort of the medicines. But be sure to look carefully into the eye every day. For if it be pained, or look angry, omit this treatment for some days, and then repeat it ; for this method of cure is very powerful and efficacious.

As to the medicines, which take off the marks of the Small-Pox from the face and the rest of the body, they are these : white litharge, dried reed-roots, rotten bones powdered, bastard sponge, coral, sarcocol, almonds, birthwort, the ben nut, radish-feed, pumpkin-feed, rocket-feed, the flower of beans, rice, lupins, and kidney-beans. On these pour the aqua amurcæ, and barley-water.

The description of a liniment, which effaces the marks of the Small-Pox.

Take of the flower of chiches and beans, each three drachms ; of pumpkin-feed five drachms ; of white litharge two drachms ; of dried reed-roots three drachms. Pound all together in barley-water : then apply it to the parts several times successively, after the patient has received the steam of hot water, or after coming out of the bath. Then again wash him in a bath, made of pumpkin-rinds, dried violets, bran, and pounded chiches, boiled in water : rub him well, and apply the liniment a second time.

The description of another liniment of greater efficacy.

Take

Take of bean-meal five drachms; bitter almonds, sweet costus, rocket-feed and radish-feed, of each two drachms and a half: apply it, as we have already directed.

Another liniment more efficacious still.

Take of bitter almonds peeled five drachms; radish-feed, rocket-feed, roots of costus, and long birthwort, of each two drachms and a half; of borax, or nitre made into cakes, three drachms; of pepper one drachm and a half: use them as we have already directed. Afterwards, wash the parts with radish-water, or with those things, which we have ordered. And those are the medicines, which efface the marks and scars of the Small-Pox.

But in order to efface the pock-holes, and render them even with the rest of the surface of the body, do thus: let the body be anointed with butter, and well tinged with the herb cyperis, or with its powder: let the patient use the bath frequently, and be rubbed down after it.

Now we are to direct what ought to be given to a patient in the Small-Pox by way of aliment, and to treat of the medicines which have relation to it.

C H A P. XII.

Of the diet of patients in the Small-Pox.

To a patient in the Small-Pox it is necessary to give barley-water, prepared in the same manner, and with the same art, as that, which is usually given to persons in acute and hot diseases. If the fever be moderate, and the body somewhat costive, it must be sweetened with white sugar-candy; but if the heat of the fever be intense, and the body loose, pour to it half a measure of the juice of acid pomegranates, pounded with
their

their feeds: but the pulps and inward thin tunicles are to be avoided; for they are laxative.

If the patient be restless, and cannot sleep, add to the barley-water some proportion of poppy. But if the body be very loose, add to the barley-water one part of dry feeds of acid pomegranates, and one part of poppy.

But, if it be requisite to bind the body, instead of barley-water, take meal of peeled barley, and the meal of pomegranate-seeds; boil these in the same manner as barley-water is made, and let the sick drink of this, as he would drink of barley-water; either alone, or with bambu-sugar and gum-arabick mixed with it, if a looseness should make it necessary; or with the medicines which I shall describe anon. For barley-water, mixed with pomegranate-juice, is very serviceable in the Small-Pox, and more especially in the Measles. But the waters of the gourd, of the Indian pompion, and of the cucumber; the mucilage of fleawort-seeds, and the like, of whatever kind, which make a mild phlegm, and easy to be spit up; these waters, I say, are more useful in the Measles, than in the Small-Pox; unless it be in those sorts of the Small-Pox, which are accompanied with a malignity and heat, together with a violent fever and want of sleep.

But in those cases of the Small-Pox, wherein the fever and inflammation are not so vehement, those things above mentioned, and others of the like kind, have no other effect, but to render them slower, and to protract the whole course of the disease: wherefore it will be your business to have recourse to this or that sort of medicines, or to abstain from them, as occasion shall require. For when the Small-Pox happens to be in the highest degree of heat and putrefaction, with the addition of moisture; then those things, which have a cooling, drying, and condensing quality, are more proper; such as juice of pomegranates, verjuice, and others of the same nature.

But when the disease is the Measles, which arise from a vehement ebullition of the bile blended with the blood; those things, which have the two-fold virtue of cooling and humecting, are the most proper in their cure; inasmuch as the corrupted blood is tempered and corrected by their means. For the blood of a person, in the Measles, is like stagnating water, which putrefies by long standing; whereby its natural texture is destroyed, and, by the action of the sun, it contracts a vicious acrimony. But if these waters are mixed with rain, or any other running sweet water, they soon recover their former wholesomeness.

Moreover, in the Small-Pox barley-gruel is beneficial, if it be taken with sugar and pomegranate-juice, or with a proper quantity of julap; giving due attention to the patient's loose or costive state, as likewise to his greater or lesser degree of heat: except that barley-water is lighter to take, easier to swallow, and more suitable to the throat and breast. Wherefore, act according to these directions, after you have been apprized, that barley-water is more proper for persons in the Measles, than in the Small-Pox; unless the Small-Pox happen to be of a bad sort, in the manner we have mentioned.

As to the rest, vetches well cleansed are good in the Small-Pox, if a food be prepared of them with the juice of acid pomegranates, or with vinegar: the meal of lentils is useful also, if the meal be wrought up with cold water.

Know likewise, that cold water is more serviceable to a patient in the Measles, than in the Small-Pox; as being safer, and of a more certain effect.

Now, when you see the Small-Pox attended with great inflammation, and a stoppage in the pulse and respiration; then give extinguishing medicines, proportioned to the symptoms: if they are less urgent, employ few; if very urgent, employ many.

But never allow the eating of young birds, until the pulse and breath have returned to their natural state; nor till the pustules are thoroughly withered, and the scabs fallen off.

Let

Let us now turn the discourse upon loosening the belly, and restraining the same in the Small-Pox.

C H A P. XIII.

Of managing the discharges of the belly, in the Small-Pox.

THE belly is generally loose in the Small-Pox and Measles towards their decline, but especially in the Measles. For which reason, every thing must be avoided which opens the body, after the Small-Pox and Measles are conducted to the end; even though the body be bound. But if it be lax, instantly abstain carefully from those things which give stools: although it be necessary in the beginning of these two diseases, and before they are on the decline, to give a laxative. For it is sometimes requisite to open the body in the Small-Pox, either upon account of the excess of heat, and pain in the head; or in order to ease nature of her load, and lessen the morbid matter, when you have reason to think it over-abundant. And it will be really so, when you find the body, both before and after bleeding, neither weakened nor wasted; but on the contrary, bloated and full, with a paleness, or a little redness, and a fluctuating pulse. For sometimes, in such a state, bleeding will not be necessary, and it will be sufficient to evacuate the superfluous humidity: and that especially, when the aforesaid signs evidently appear; and besides, if through the sluggishness of the fever, the body be dejected, and entirely void of a red colour. In this state, a very proper medicine is a decoction of yellow myrobalans, if it be drank with white hard sugar, and the juice of an acid pomegranate, (two or three, if there be occasion) bruised with the pulp and internal tunics. For it is the quality of these two medi-

D d d cines

cines to purge the body of the superfluous humours, together with part of the bile, without raising any heat; especially the pomegranate juice; and to leave nothing behind them in the intestines. And this is the best medicine, which can be given in this case.

But in the Measles give the juice of Damascene plumbs, and the plumbs themselves, fresh gathered, either alone, or bruised with julap, adding sugar to them. But avoid the medicine called tarangioben^c: for it is as prejudicial in the Measles, as honey is in the Small-Pox; both upon account of the excessive heat, which it occasions, and of increasing the nauseating and uneasiness of the sick. In like manner carefully avoid giving them the juice of ivy, or of the black violet to drink: because they both equally heighten the disorder in the body.

Now, whereas the first and most necessary remedy in the Small-Pox is, to draw blood, when it is too much in quantity, or there is no prospect of checking its ebullition by any other means, even by extingvents; but there is a necessity for taking a little away, as well for relieving nature, as for abating the fullness of the blood-vessels, and easing them of their over-great load, which must otherwise be productive of very bad consequences; especially if the blood be heated to that degree, that a violent inflammation might ensue: in the same manner, it behoves you, in the beginning of the Measles, to draw off some of the bile, when you perceive it over-abundant; and then to pursue what remains of it by extingvents. Now the sign of an excessive redundancy of the bile is, the violence of the inflammation, and the uneasiness, together with the discharge of the same bile, both by vomit and stool, and a bitterness in the mouth.

But if the quantity of the bile is not excessive, and yet there is an uneasiness, and thirst, and vehement heat, without any
appear-

^c A sort of manna among the Sogdians, Medes, and Babylonians, which concretes on the leaves of certain shrubs, and is gathered thence.

appearance of bile, either by vomit or stool ; though its quantity, I say, be not excessive, we may however judge it to be of a bad quality, in proportion to the violence of the inflammation and uneasiness.

And this is what I have thought proper, that you should know, concerning the management of the discharges of the belly, when it is loose in the beginning of these two distempers. Now, if the belly be lax, give nothing laxative : for in this case, any thing that increases the discharges is not safe in either of the distempers. But while the belly continues loose, order the patient, instead of barley-water, to drink barley-gruel ; and if it be necessary, boil the barley-gruel with meal of pomegranate-seeds ; of which let him drink, before he returns to the use of barley-water. And if, this notwithstanding, the looseness still increases, mix gum-arabick and bambu-sugar in his drink in this manner.

Take of gum-arabick two drachms ; of bambu-sugar one drachm : reduce them to the consistence of a collyrium : then on four ounces of the barley-gruel pour some of the medicine, which I am going to describe ; let it stand for an hour, and give it to the patient to drink.

The description of the medicine.

Take of red roses ground fine, bambu-sugar, sorrel-feed, sumack, and berberies, of each equal parts ; also gum-arabick, sealed earth, poppy-rinds, balaustines, or pomegranate-flowers, of each half the quantity : let the patient drink three drachms of these, with one ounce of the juice of acid pomegranates.

But, if the looseness still continues, and has weakened the patient, give him draughts of al-râib, that is, four skimmed milk, with the best sort of biscuit, and a little gum-arabick.

Finally, whenever a dysentery appears, the method of cure must be taken from the place, where we have treated of that subject.

Now it remains, that we speak of those, who recover, and of those, who die of the Small-Pox and Measles.

C H A P. XIV.

Of the curable and incurable Small-Pox and Measles.

THE Small-Pox and Measles are of the number of hot diseases, and therefore have many things in common with them. Now the chief prognostick signs in those, who recover, are, a freedom of respiration, a thorough soundness of mind, and an appetite for food; an agility to motion; a right state of the pulse; the patient's good opinion of his disease; a convenient posture in bed; and but little tossing about and inquietude of body.

Hence a judgment may be formed of bad signs, the greatest part of which we have related in the book, intituled, *Almanfori* ^f.

These things following particularly regard the Small-Pox and Measles.

When the pustules of the Small-Pox are white, large, separate, few in number, easy and speedy in coming out, and the fever not violent or burning, nor attended with much inquietude of body or concern of mind; and are so qualified, that the heat, concern, and inquietude diminish upon their eruption, and entirely cease, when the eruption is completed: that sort is curable, and threatens little or no danger. To these the next in goodness are, white large pustules, though very numerous and coherent;
if

^f There is a MS. copy of this book in the Bodleian library, Narciss. Marsh, N^o 376.

if they come out easily, and their total eruption eases the patient of his uneasiness and excessive heat, as we have already mentioned.

But when their eruption is performed with difficulty, and the patient does not grow better upon their coming out, they are a bad sort: although there is not so much reason to be afraid, if he should be ill while they are coming out, as if he continues so after the eruption.

But there is a bad, and even a fatal sort of white large pustules, to wit, those which run together, and spread so that many of them unite, and occupy large spaces of the body; or become like broad circles, and in colour resemble fat.

As to those pustules, which are white, very small, coalescing, hard, warty, and contain no fluid; they are of a bad kind: and their badness is in proportion to the degree of difficulty in their ripening, and to the continuance of the symptoms on their eruption. But if the symptoms are not abated, after the eruption is finished, it is a mortal sign.

Those pustules also are all bad, which turn green, purple, or black. But if, besides, a swooning and palpitation of the heart come on; this is the worst sign of all, nay a sign of certain death.

And when the fever increases after the eruption of the Small-Pox, it is a bad sign. But if the fever ceases at the time of the eruption, it is a good sign. Doubled pustules indicate a great quantity of the matter of the disease: and if they are of the curable kind, they portend recovery; but if of the mortal kind, death.

Those Measles are the safest which have not too much redness: but if they turn pale, it is a bad sign; the green and purple sorts are both mortal. When either the Small-Pox or Measles sink in suddenly, after they began to shoot out; and then the patient is seized with inquietude and anxiety, and a swooning comes.

comes on; it is a sign of speedy death; unless they push out again, after they have subsided.

If the pustules appear on the first day of the fever, they will hasten their progress, and be of quicker motion: if the eruption is protracted to the third day, it will advance moderately; but if the first appearance passes the fourth day, the eruption will be completed dully and slowly.

When the appearance begins on the good critical days, it is a salutary sign, especially if the patient finds himself better at the end of the eruption; and so on the contrary. But when the pustules begin to run into one another, and to spread; and at the same time the inquietude increases considerably, and the belly swells or is bloated; then death is near at hand. When the smaller sort of pustules, which contain no fluid, grow hard; and a delirium comes on at the same time; the patient is near his end. When it happens that the Small-Pox and Measles appear and disappear alternately, and are attended with anxiety and a delirium; this is a sign of death, of what colour soever the pustules are: but it is seldom the case of white pustules, or of those which ripen quick. When towards the end of the Small-Pox, there is a great perturbation of the humours, and the patient is seized with a very violent pain in a leg, hand, or any other limb; or the pustules are speedily converted into a green or red colour; and thereupon he grows weaker than he was before, and the weakness still increases by the quick returns of the pain, and the limb contracts various colours; these are signs of death. But if nevertheless the patient grows stronger, he will recover, and that limb will be cured.

Now if you scarify that limb the very moment, when the pain begins to seize it, you will render great service to the patient, if he grows stronger after the incision; and the limb will also be preserved from mortification.

But, in this dangerous case, nothing cooling must be applied to the limb, upon any account whatsoever: but either scarify it, or plunge it into hot water, if you see that the patient can bear it.

Wherefore, as we have run over all the articles, which we proposed to ourselves; and have amply enough treated, both of this disease, and the method of preservation from it; we here break off the thread of our discourse.

To the bestower of strength to finish this work, be praise without end, as he is worthy of being celebrated and praised.

A N

HISTORICAL ACCOUNT

OF A

NEW METHOD

For extracting the

Foul AIR out of SHIPS, &c.

E c e



P R E F A C E.

I HAVE often said, that it is not, in our country at least, so easy a thing to serve the publick, as is commonly imagined; not meaning hereby the difficulty of finding out useful experiments, (although even that is great enough) but the hardships, which attend the putting them in practice. Whence this should come to pass, it is foreign to the present purpose to inquire. They who are acquainted with the several motives, upon which men often act, among which self-interest, envy, pride, and obstinacy, have no inconsiderable share, will readily see the springs of this seemingly unaccountable disposition of mind.

I would not have it thought, that I have had occasion to make this ill-natured remark, from what I may myself pretend to have done for the benefit of the publick: but it is sufficiently justified by the opposition, which the invention described in the following treatise has met with. The machine is so simple, and of so extensive advantage, that as it is surprizing to see the greatest pains taken to make it abortive at first, so it is no less strange that it has not been so universally used, in the royal navy, as might have been expected from the great good, which it promises.

It is not my business to examine the causes of this neglect; which is in a very moving and handsome manner complained of in the voyage of the great lord Anson^a; an immortal work, which will be always read with a pleasure, equal to the benefit to be reaped from it, with regard to our navigation and commerce to those parts of the world, to which the adventures relate.

As this hero is not less admired for his humanity and good sense, than for his conduct and courage; he has taken care that the relation of his enterprises should be a monument of the one, as well as of the other. The accounts given of that strange disease, so fatal to our seamen, the sea-scurvy, are hints so new and useful in physick, that I have thought it not unbecoming the place, with which I am honoured in my profession, to write a short discourse on this subject, and give it to the honest and ingenious author, to be published together with his reprinted Account of a new method for extracting the foul air out of ships, &c. : an invention, which I may venture to say, does honour to our nation, and will in time be found of more publick benefit than any discovery in mechanicks, which has been produced these hundred years.

Having therefore had the satisfaction, in the beginning, to recommend this experiment to the admiralty, I now join a short Discourse on the Scurvy to the reprinted edition of Mr. Sutton's book, as a convincing and happy proof of the success, which attends it. And
the

^a See p. 36, 37.

the author has also added some other authentick accounts to the same purpose. From all these things duly considered, it is to be hoped that the evil spirit of opposition, which, as is mentioned in Mr. Sutton's Account, &c. exerted itself even against the making a trial, will now be rebuked and cast out.

To conclude, as any one versed in mechanicks will easily see (as we formerly observed) that this management of the air may be applied to many other purposes of life; (to some instances of which I have been an eye-witness) so it will prove a great loss to mankind, if it is not universally brought into practice: especially, since by the generosity and disinterestedness of the inventor, the whole expence may be considered as a trifle. Many more considerations might be urged; but they will readily occur to the wisdom of those, whose province it is to direct our naval affairs.

The foregoing Preface was written, and ready to be put to the press, when Mr. Sutton brought me the agreeable news, that the right honourable the lords of the admiralty had just then given him orders, to provide all the ships of his majesty's navy with this useful machine. Thus, laudable discoveries, though discountenanced at first, do at last break through all difficulties, and meet with suitable encouragement.

R. M.

A N

HISTORICAL ACCOUNT

O F A

N E W M E T H O D

For extracting the

Foul AIR out of SHIPS, &c.

S I R,

PURSUANT to your desire, I now send you an historical account of my scheme, together with the reasons that first inclined me to employ my thoughts about it. In the year 1739, I was informed by a gentleman, that the sailors on board the fleet at Spithead were so dangerously ill, for want of fresh air, that they were put ashore to recover their health; and the ships to which they belonged, stunk to such a degree, that they infected one another. In compassion to my fellow-creatures, I thought myself obliged to do all that was possible for their relief in these unhappy circumstances, and from this time tried what could be done by fire. I at length found, that by stopping the air out of a room that had three fire-places, and making two large fires in two of them, I could bring the air

to draw down the third chimney, with such force as to put out a candle. I then lighted a fire in the other chimney; which so rarified the air in the room, that the incumbent air pressed to enter in, and with a force sufficient to raise a pulley with half a hundred weight; and as soon as the room was cooled, by the coming in of the air, the door would shut, and then open again in three minutes.

Having proceeded thus far with good success, I stopped up all the chimnies in the house, the garret excepted, and then lighted two large fires, which drew the air down the chimney with such violence, as to put out four or five candles immediately: whereupon I concluded, that, a fire, being always kept on board a ship, and a pipe or cavity made to the well, one end of it being heated by fire, a change of air would follow, and that, by this means rendered sweet and pure, and fit for respiration.

From this time I made it my business to consult the officers and sailors of the navy, who all agreed that such a change of air would be of the greatest use imaginable, in preserving the lives of the men on board his majesty's ships. I particularly remember, that, being at a coffee-house near the admiralty, I placed myself nigh some gentlemen of the navy, and enquired of them, as I had before of others, as to the usefulness of the forementioned change of air, who all, to a man, acknowledged that it would be of the utmost service; and, upon their unanimous approbation of it, I told them that I could procure such a change of air; upon which one of the company went to another table, and the rest followed him; and I heard him tell the others, that he heartily pitied me, as being really mad, and out of my senses.

Upon this unexpected treatment, I resolved to apply to some person of consequence in the navy, of approved integrity; and well knowing that Sir Charles Wager was a gentleman of this character, and withal of the greatest humanity, I waited upon Mr. Gashery, a commissioner of the navy, and acquainted him that I would communicate my invention to Sir Charles, by word of mouth; and that if I did not, in a few minutes, convince him
of

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of its usefulness, I would withdraw immediately, without giving him any further trouble about it.

Mr. Gashtery was so kind as to speak in my behalf to Sir Charles, and thereupon I was introduced into his presence. I desired Sir Charles to be so good as to permit me to ask him some questions relating to my affair, which he was pleased to permit. I asked him, whether he had ever considered the principles, upon which the operations of the cupping-glass were founded? that, rarefaction being made in the glass, by means of the fire, and the glass pressed to the skin, the air in the blood presses out the skin; and, the skin being cut, and a second rarefaction made, the blood presses forward to the place where the rarefaction was made. I told him, that in like manner I proposed to procure a change of air on board his majesty's ships, by means of a fire in the cook-room, and laying proper pipes for that purpose.

Sir Charles, upon my discourse with him about my scheme, not only expressed his approbation of it, but favoured me with the following letter to Sir Jacob Ackworth, surveyor of his majesty's naval works :

S I R,

‘ **T**HE bearer hereof, Mr. Sutton, has found out a method
‘ to extract the foul air out of the wells of ships, which
‘ will be of great use for preserving the lives of the men aboard
‘ his majesty's ships. He will be willing to talk with you, if an
‘ experiment can be made, so that he may not lose the benefit of
‘ the invention.’

I accordingly waited on Sir Jacob, who ordered me to come to him again, five days after, at seven in the morning ; at which time he being engaged in business, I waited at the office till evening, when he was pleased to express himself to me in the following words : ‘ Sir, I suppose you intend to throw air into the
F f f ‘ wells

‘wells of ships.’ I answered, ‘No, I proposed to draw it out, by means of fire.’ Upon this he asked me, ‘if I knew how far I was to draw it out?’ I replied, ‘not six inches: for, if I could extract it never so small a distance, the incumbent air would press forward of course, and, in so doing, cause a constant change.’ He admitted this. I then told him, that I waited upon him, by Sir Charles Wager’s orders, in hopes that he would appoint a time for an experiment to be made of my scheme: to which he replied, ‘that no experiment should be made, if he could hinder it.’

Upon this disappointment, I petitioned the lords of the admiralty, and thereby obtained an order from them to the commissioners of the navy, to cause my experiment to be tried on board the Greenwich man of war, then lying at Woolwich. I forthwith carried their lordships order to Woolwich, and, pursuant thereto, to the satisfaction of myself, and all on board the Greenwich, I placed the pipes, and all things necessary for my experiment, except the foldering of two pipes: but, whilst the folder was hot, and the plumber in readiness to folder them, a messenger from the builder of his majesty’s yard came to order the workmen ashore. I thereupon repaired to the builder, who acquainted me, that I must apply to the navy-board, to procure an order to have my experiment performed on board the hulk at Woolwich. I instantly replied, that, all the proper preparations being already compleated, except the foldering of two joints, which might be done in an hour’s time, I desired it might be tried immediately. But to this he made answer, that I must apply to the navy-board, in order that they might procure an order from the lords of the admiralty for the trying it on the hulk aforesaid. I thereupon told him, that I insisted on those two joints being foldered, that I might make my report to the lords of the admiralty, that I had faithfully executed their order; upon which, he assured me, they should be foldered that very night: but when I went on board the next day, to see if they

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they were foldered, I found them just as I left them the day before.

Finding myself thus disappointed, I took a candle, and went down to the pipes, which were carried through deck, and laid under the beam, towards the well, about thirty feet in length from the copper; and, as soon as I put the candle to the ends of the pipes, they immediately extinguished the flame: which fully convinced those on board of the great usefulness of my invention. But to my extreme surprise, I no sooner came on shore, than I found, that the master afloat was sent from the king's yard, to take down my pipes, and plug up the holes: upon which, perceiving the obstructions my experiment would meet with, I determined to apply to some gentlemen of the faculty of physick, that were proper judges of the usefulness of my scheme.

Being no stranger to the character of Dr. Mead, physician to his majesty, distinguished as much by his humanity as his abilities, I went directly to his house, shewed him Sir Charles's letter, and, by his appointment, the next morning came thither again, where I met the learned Martin Folkes, Esq; president of the royal society, whom the doctor had desired to talk with me, together with himself, upon my proposal. They both expressed their approbation of it, and most readily offered to do whatever was in their power, to encourage an invention which they judged must be of great service to the publick. Accordingly Dr. Mead immediately waited on the lords of the admiralty, and represented to them, in a strong manner, the advantage of such a contrivance: whereupon they were pleased to order, that it should be tried, as soon as possible, on board any of his majesty's ships in the river.

Being now left at my own liberty, to chuse a proper place for my experiment, I fixed upon the hulk at Deptford, because that was immoveable, and could not, like a ship, be sent away: and upon this I directly went to Deptford, in order to make the necessary preparations. I was soon acquainted there, that several

of the workmen belonging to the king's yard were busily employed in trying the usefulness of another machine, industriously set on foot to supplant mine: but, after the strictest enquiry I have since been able to make, I cannot learn that they had any orders to that purpose from the lords of the admiralty.

This proceeding, together with the excessive shyness and caution of the gentlemen of the yard, led me to conclude, that my scheme, at last, would be set aside, in spite of all the steps I could take to prevent it; and I was confirmed in this opinion, when I found the pipes were made of wood, between five and six inches wide, in such an unworkmanlike manner, that, to render them tight, I was forced to get size and paper from Deptford, to put over the joints; and that moreover many hands were employed in erecting wind-sails, in order to shew, that they could thereby procure as much air as my scheme would afford.

At length, in September, 1741, the day appointed for the trial of the experiment came; when the lords of the admiralty, the commissioners of the navy, Dr. Mead, Martin Folkes, Esq; and several other members of the royal society, being present on board the said hulk; Sir Jacob Ackworth was pleased to say, in the hearing of them all: 'I am sorry that you are come to see
' the trial of such a foolish experiment, that I tried myself
' yesterday, and it would not not shake a candle.' To this I replied, 'It would be in good humour to-day, and the end of
' every one of the pipes would blow out a candle.' And accordingly, notwithstanding the forementioned obstructions, and that the tarpawlins were taken away, which I had ordered to be laid over the hatches, I was as good as my word; and all the lords and gentlemen aforesaid, upon the trial of my experiment, expressed their approbation of the performance.

In November following, I was sent for by the messenger to the commissioners of the navy, and by them, pursuant to an order from the lords of the admiralty, sent down to Portsmouth,

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to prepare the Norwich man of war according to my scheme;
and, upon this occasion, Sir Charles Wager, in the presence of
the lords of the admiralty, honoured me with the following letter
to commissioner Hughes at Portsmouth.

S I R,

Admiralty-Office, 24 Nov. 1741.

‘ I SEND this by Mr. Sutton, who has found out a way to
‘ draw bad air out of close places, particularly from wells
‘ of ships, which you know are sometimes so bad, as to
‘ stifle men before they can be drawn up; as happened on
‘ board the Lynn, while I was at Helvoet-Sluys; one man be-
‘ ing killed by it, and two narrowly escaped. This contrivance
‘ is approved by much wiser men than I am in such things;
‘ and therefore I desire you would let Mr. Sutton have all the
‘ encouragement and assistance you can give him. I take Mr.
‘ Alleyn, your builder, to be an ingenious man; if you recom-
‘ mend Mr. Sutton to his care, he will see that he meets with
‘ no obstruction or discouragement from any body, that may
‘ think themselves wiser. There is an order from this board to
‘ the navy, from whom you will have it, to have the Norwich,
‘ who is to go to the coast of Guinea, to be fitted according to
‘ Mr. Sutton’s scheme; which will be a very good experiment.’
I am,

S I R,

Your humble servant,

CHARLES WAGER.

This letter I carried down to Portsmouth, and delivered to
commissioner Hughes, who received me in a very friendly man-
ner, and recommended me to Mr. Alleyn the builder; who
both of them (and indeed all the persons belonging to the yard)
exerted

exerted themselves to the utmost of their power, to forward my undertaking; and at length I compleated it, agreeable to the plan I shall hereafter exhibit.

Having finished this business, I waited some days at Portsmouth, for a report signed by admiral Lestock, and several commanders of ships, which captain Gregory gave me reason to expect: but, at last, (though to do the captain justice, I must own, that he treated me, whilst at Portsmouth, in an obliging manner), I was acquainted, that no report could be made, till the Norwich returned from its voyage; which was sent to Guinea, and from thence to the West-Indies: which constrained me to repent of my journey.

Soon after my return to London, I found things in the utmost confusion, by the sudden change of the ministry, which likewise occasioned a change in the admiralty. I petitioned however the commissioners of the navy, humbly requesting them to make a report of what I had done, from time to time, from the 10th of July, to the 10th of Decem. 1741, at Greenwich, Deptford, and Portsmouth, in compliance with the orders of the lords of the admiralty; in order that I might receive a suitable reward for my useful invention, and reasonable satisfaction for my trouble, loss of time, to the neglect of my other affairs, and expences in the execution of the same. But I received no answer, nor to many petitions I delivered to the lords of the admiralty themselves; until at length, justly moved at the cold and unkind treatment I met with, I freely expressed my sense of their hard usage, in the following petition.

To the right honourable the lords of the admiralty, the
petition of Samuel Sutton,

Humbly sheweth,

THAT your lordships petitioner, having invented an useful scheme, for the extracting foul air out of his majesty's ships (which, in the month of September, 1741, was tried before

fore the then lords of the admiralty, who approved the performance) lately applied to your lordships; but, to his extreme surprise, he finds, that he is not likely to receive any reward, either for the invention itself, or his loss of time and expences: nor are his majesty's sailors and mariners likely to receive any benefit from his scheme; though it is universally acknowledged, that more of them have lately died in America, for want of good air, than by the Spaniards. That your lordships petitioner cannot help remarking, that, though no invention ever met with more applause from the publick than his, never was any man (himself excepted) employed by the lords of the admiralty, from time to time, at his own charges, as he has been, without a proper consideration. That your lordships petitioner now desires, that you would be pleased to consider him on that account, and order him a suitable satisfaction; and as in duty bound for your lordships he will

Ever pray.

This petition was overlooked like the rest, nor was there any notice taken by the lords, either of me, or my scheme, till captain Gregory returned to London; who, soon after his arrival, sent a letter to the then lords of the admiralty, in reference to the Norwich man of war, which I fitted up at Portsmouth; and the following extract of it was left at their office for me.

Extract of a letter from captain Gregory, late commander of his majesty's ship the Norwich, to Mr. Corbett, dated June 11, 1743.

‘ **A**s to the air-pipes which were put on board of me, I
 ‘ was obliged to stop up two of them, by reason the fire
 ‘ came down between decks: the other to the well was kept
 ‘ open, but the ship making water enough to keep her sweet, I
 ‘ was

‘ was not able to judge of their use, having been so healthy as
 ‘ to bury only two men all the time I was on the coast.’

Copy, Tho. Corbett.

I have many remarks to make upon this letter, which by no means can be justly called a report, since the other officers of the ship were not consulted; particularly the surgeon, and the carpenter, or other under officers, the most competent judges; the former, of the health of the men; and the latter, of the sweetness and good condition of the provisions. As to Mr. Haddon the carpenter, who had been several voyages to Guinea before, and never knew the like; he assured me that the provisions continued entirely sound, and the men healthy, free from the scurvy or any other disorder, to the admiration of the people of Barbadoes, who therefore questioned, whether they had been at Guinea, or no: and indeed, this matter of fact, which is the main point, is for substance acknowledged by the captain himself; though at the same time, he is pleased to say, ‘ that he
 ‘ was not able to judge of the use of my pipes.’ This gentleman it seems lost so few men that he could not discover the usefulness of my pipes; but, had he lost the greatest part of his crew, I dare say that he would have been able to judge, that my pipes were of no service at all. But, though the extract of the captain’s letter carries its own confutation along with it; yet, as it was sent to the lords of the admiralty, I thought it expedient to give an answer to it, in the following letter to the earl of Winchelsea.

My LORD,

‘ **T**HOUGH I have petitioned the right honourable the lords
 ‘ of the admiralty several times, and even wrote to your
 ‘ lordship, in reference to my extracting foul air out of his ma-
 ‘ jesty’s

‘ jeſty’s ſhips, and never received any answer, except an extract
 ‘ from captain Gregory’s letter; yet, in juſtice to my ſcheme, I
 ‘ apprehended myſelf obliged to lay before your lordſhip ſome
 ‘ juſt remarks on the ſaid extract, which I hope will effectually
 ‘ remove any inferences that may be thence drawn, to the pre-
 ‘ judice of my uſeful invention, which is founded on the moſt
 ‘ evident principles, and may be put in execution, at ſo eaſy a
 ‘ charge as about thirty pounds, in any of his majeſty’s ſhips.
 ‘ As to the captain, he ſays, that he was obliged to ſtop up two
 ‘ of my pipes, by reaſon ſome ſparks of fire came down be-
 ‘ tween the decks. But this might eaſily have been prevented, by
 ‘ adding two pipes of tin (which they never want) three feet
 ‘ long, and bringing them through the chimney, by which all
 ‘ communication would be cut off between thoſe ſparks and it.
 ‘ The captain alſo declares, that he could not tell, whether the
 ‘ pipe to the well, becauſe of the water in it, was of uſe or not;
 ‘ but, which ſeems to be very unfair dealing, he intirely over-
 ‘ looks two other pipes. I intreat your lordſhip to be pleaſed to
 ‘ conſider, that the pipes draw more air than any kitchen-chim-
 ‘ ney, and what is ſufficient to ſweeten any ſhip in the navy.
 ‘ The captain himſelf owned to me, that not ſo much as one of
 ‘ his men had the ſcurvy, which cannot be ſaid of any of his
 ‘ majeſty’s ſhips heretofore, or that out of ſuch a number, ſo
 ‘ few have loſt their lives, and ſo many have returned in perfect
 ‘ health from ſuch a voyage: and indeed, if my ſcheme was ge-
 ‘ nerally put in practice, this, in all likelihood, would become a
 ‘ common caſe, nor would ſhips, that come from infected places,
 ‘ have any occaſion to perform quarantaine, the air being pre-
 ‘ ſerved by the foreſaid pipes, in a pure and wholeſome ſtate.’
 I am,

My LORD, &c.

And as the principal, and indeed only, objection, in the extract againſt my ſcheme, was the danger of fire; I wrote the

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following letter to Sir Jacob Ackworth, his majesty's surveyor,
in order to shew, that it was entirely groundless.

Honoured S I R,

‘ **W** HEN a scheme is proposed for the good of mankind
‘ in general, and the preservation of the lives of his
‘ majesty's subjects in particular; it is doubtless highly reason-
‘ able, that, as it is a matter of great consequence and import-
‘ ance, a strict inquiry should be made, whether it be practi-
‘ cable, and will effectually answer the end proposed. As to
‘ the inconveniency apprehended to attend mine, that it will
‘ expose ships to the danger of fire, I intreat you to be so good
‘ as to enquire of any bricklayers, or builders, whether this ap-
‘ prehension be not entirely groundless. I could heartily wish
‘ that you would be pleased to satisfy yourself in this particular;
‘ as your declaration, on this point, in my favour, would have
‘ great weight with the lords of the admiralty; in order to my
‘ being by them appointed to have the directions of laying pipes
‘ on board his majesty's ships.’ I am, Sir, firmly relying on
your goodness,

Your humble and obedient servant,

SAMUEL SUTTON.

Soon after, when the plague raged in Sicily, and timely pre-
cautions were taken to prevent its being introduced hither, I
again wrote to the earl of Winchelsea, as follows.

My LORD,

‘ **A** PROCLAMATION being issued out for ships to perform
‘ quarantaine, I humbly beg leave to acquaint your lord-
‘ ship, that if my scheme for extracting of foul air, was properly
‘ put

‘ put in practice on board such ships, it would effectually pre-
 ‘ serve the health and lives of his majesty’s subjects. And, such
 ‘ a fume being let down as the physicians may judge expedient,
 ‘ great advantages would arise, without any ill consequences
 ‘ whatsoever: because, the foul air being consumed by the fire,
 ‘ the fume, by means of a pipe let into the hold of the ship,
 ‘ will with ease be drawn down, there being a want of it to
 ‘ supply what is extracted. If your lordship will be pleased to
 ‘ consult the physicians, you will find that what I offer is practi-
 ‘ cable, being founded on just and rational principles.’ I am,

My LORD,

Your humble and obedient servant,

SAMUEL SUTTON.

Sir Jacob Ackworth, Mr. Alleyn of Deptford, and the rest of the surveyors will readily attest, that no damage can arise from the fire made use of in my scheme; which is the only objection that has hitherto been advanced against it.

Having thus refuted the foresaid objection, and I hope in a convincing manner, it was natural for me to expect, without any longer delay, a reward suitable to the importance and usefulness of my invention; but it was some time after this, before I received the following order from the lords of the admiralty.

Extra.

Received the 31 Oct. 1743.

No. 688.

Mr. TREASURER,

No. $\frac{2619}{1743}$. ‘ I
 ‘ IN pursuance of an order from the right honour-
 ‘ able the lords commissioners of the admiralty,
 ‘ dated 22 October, 1743, signifying that, whereas Mr. Samuel

G g g 2

‘ Sutton

‘ Sutton did, sometime since, propose to that board an invention
 ‘ of his, for extracting the foul air out of ships by fire, and
 ‘ letting in fresh air, an experiment of which was ordered to be
 ‘ made on board his majesty’s ship the Norwich, bound to the
 ‘ coast of Africa; and captain Gregory, who commanded the
 ‘ said ship, having since his return made a report thereof, a copy
 ‘ of which their lordships sent us therewith, whereby it appears,
 ‘ that it does not, in all respects, come up to the expectation,
 ‘ and that the use thereof is dangerous, and liable to accidents
 ‘ by fire: yet, as the said Mr. Sutton has employed a great deal
 ‘ of pains and time about the said invention, for the benefit of
 ‘ the navy, and had encouragement from their lordships so to
 ‘ do; and their lordships being desirous to give encouragement
 ‘ to persons who shall turn their thoughts to any inventions that
 ‘ may tend to the advantage of the navy, do thereby desire and
 ‘ direct us to cause a bill of one hundred pounds to be made out
 ‘ to the said Samuel Sutton, as a reward for the loss of time and
 ‘ expences he has been at about the said invention.

‘ We pray you to pay unto Mr. Samuel Sutton accordingly,
 ‘ the sum of one hundred pounds, dated 22 Oct. 1743.’

J. B.
 31 Oct. 1743.

RICH. HADDOCK.

JAM. COMPTON—Ca. Account.

J. B. No. $\frac{2360.}{359.}$ }

This, Sir, was all the satisfaction I could procure from the
 lords of the admiralty, though I had from time to time, exe-
 cuted their orders with the utmost fidelity, and even that, not till
 above two years after the trial of my first experiment on board
 the hulk at Deptford: a satisfaction that scarcely defrayed my
 expences.

expences. But I am persuaded from what has been already said, you clearly perceive, that, as matters stood, if the usefulness of my scheme had appeared in the most demonstrative light, I should, after all, have fallen short of a suitable reward; and indeed, this is the truth of the case. Dr. Hales's ventilators, which were designed to answer the same purposes as my pipes, had, by some means or other, got such an ascendant in the esteem and regard of some leading persons in the affairs of the navy, as, in spite of conviction itself, to admit of nothing to come in competition with them; though even that darling scheme is now out of date and exploded. Far be it from me, to insult and triumph over a conquered adversary: and it is needless, as well as cruel, to spend much time in confuting a scheme, that experience has abundantly shewn to be absurd and ridiculous. However, I think it incumbent on me to observe, how much I was surprized to find no mention made by the candid author of the Description of ventilators, of my invention: whereas he himself saw an experiment made before the royal society with a model of it, and heard Dr. Mead's account of it read to that learned body; which account was published in the Philosophical Transactions some time before the book of Ventilators was printed. Upon the whole, this is a peculiar advantage attending my invention, that its beneficial influences are perpetual, without the least intermission; whereas Dr. Hales fully evinces the insufficiency of any attempts to make the air in ships wholesome, by only a few hours ventilation. 'It were to be wished (says he, p. 41.) that there should not be so much as one hour without ventilation, when the ports are shut.' His ventilators are cumbersome machines, taking up more room than can conveniently be spared, and require many hands to work them: my pipes take up no room, but what may be very well spared, and stand in need of no manual labour at all. His ventilators have only a casual and uncertain, but my pipes a certain and uninterrupted, effect. His ventilators cannot extract the air from the well at the bottom of the
ships;

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ship; but mine do this, and introduce pure and wholesome air, in the place of impure and unwholesome. His ventilators, he tells us, will keep a prison sweet; but my pipes will sweeten even a boghouse, and may be conveyed miles under ground into the deepest mines and subterraneous cavities, with the same success. His ventilators require much more air than my pipes, which will admit of more or less, as shall be thought expedient. And, as my scheme, in all these respects, surpasses his; so his is dead and buried, without any hope of a resurrection, whilst mine rises in its reputation daily: and the report of captain Comyns, commander of the Fame privateer, which I fitted up some months ago, and which is returned to Lisbon with his crew in health and vigour, will give such an ample and satisfactory attestation of the safety and usefulness of my pipes, as will be sufficient to dispel the doubts and suspicions of the most incredulous.

To conclude: the simplicity of this machine; its easy stowage without being cumbersome; its operation without any labour to the seamen; the small expence to put it in execution, and maintain it; besides its tendency to preserve the health and lives of the seamen, to keep the ship dry, and the merchandize from damaging; are strong reasons why no ship should go to sea without it. I am,

S I R, Your's, &c.

SAMUEL SUTTON.

An account of Mr. Sutton's invention and method of changing the air in the hold, and other close parts of a ship; communicated to the royal society by Richard Mead, M. D. physician to his majesty, fellow of the royal society, and of the royal college of physicians, London.

Read Feb. 11, 1741-2.

IT is found by daily experience, that air shut up and confined in a close place, without a succession and fresh supply of it, becomes unwholesome, and unfit for the use of life.

This is more sensibly so if any stagnating water be pent up with it.

But it grows still worse, if such an air as this is made use of in respiration, that is, becomes moister and hotter, by passing and repassing through the lungs.

These bad effects, in different degrees, according to the different manner in which air is inclosed, are observed in many cases; particularly in deep wells and caverns of the earth, in prisons or close houses, where people are shut up with heat and nastiness: but most of all in large ships, in which, with the stench of water in the hold, many men being crowded up in close-quarters, all the mentioned circumstances concur in producing greater mischief than would follow from any of them single.

The reason of these bad effects is this: it is that property of the air which is called its elasticity or springiness, which makes

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it so useful to our life. When any part of it is inclosed and kept from the communication of the outward air, it expands itself, and, in proportion to the closeness of the place, loses its spring; and if any heat or moisture comes to it, the elastick force may be quite lost and destroyed. And not only so, but if it happens to be impregnated with noxious effluvia, either from unwholesome substances of any kind, or from the infectious breath of diseased bodies; it will become quite poisonous and deadly, in a manner suitable to the original cause.

It is proposed at present to find out a remedy for this evil in ships only: but by making alterations according as particular places require, the same may be applied to any houses or parts of them, as prisons, the sick wards in hospitals, &c.

Now it is a natural consequent of the elasticity of the air, that when it is rarefied in any part, (which is most effectually done by heat) the neighbouring air will rush that way, till this part is brought to be of an equal density and elasticity with itself; and this again will be followed by the air next to it: so that, if a conveyance for air be laid from the hold or well of the ship, and a refaction of the air therein be made; the foul air from this place will run or be drawn out that way, and fresh air from the adjacent parts will succeed in its room.

It is upon these principles that the following scheme is most humbly offered to the right honourable the lords of the admiralty, and commissioners of the navy, which it is hoped will be found effectual for clearing the bad and corrupted air from the holds, and other close parts of his majesty's ships; and thereby prove beneficial to the publick, by preserving the healths of many of his majesty's good subjects serving on board the same; the whole thing being indeed easy to be executed, and what will no way incumber, or be troublesome, in any of the vessels where it shall happen to be applied: the same being, in short, no more than this: that whereas in every ship of any bulk, there

is already provided a copper or boiling-place proportionable to the size of the vessel; it is proposed to clear the bad air by means of the fire already used under the said coppers or boiling-places, for the necessary uses of the ship.

It is well known, that under every such copper or boiler, there are placed two holes, separated by a grate; the first of which is for the fire, and the other for the ashes falling from the same; and that there is also a flue from the fire-place upward, by which the smoke of the fire is discharged at some convenient place of the ship.

It is also well known, that the fire once lighted in these fire-places, is only preserved by the constant draught of air through the forementioned two holes and flue; and that if the said two holes are closely stopped up, the fire, though burning ever so briskly before, is immediately put out.

But if after the shutting up the abovementioned holes, another hole be opened, communicating with any other room or airy place, and with the fire; it is clear, the said fire must again be raised and burn as before; there being a like draught of air through the same, as there was before the stopping up of the first holes: this case differing only from the former in this, that the air feeding the fire, will now be supplied from another place.

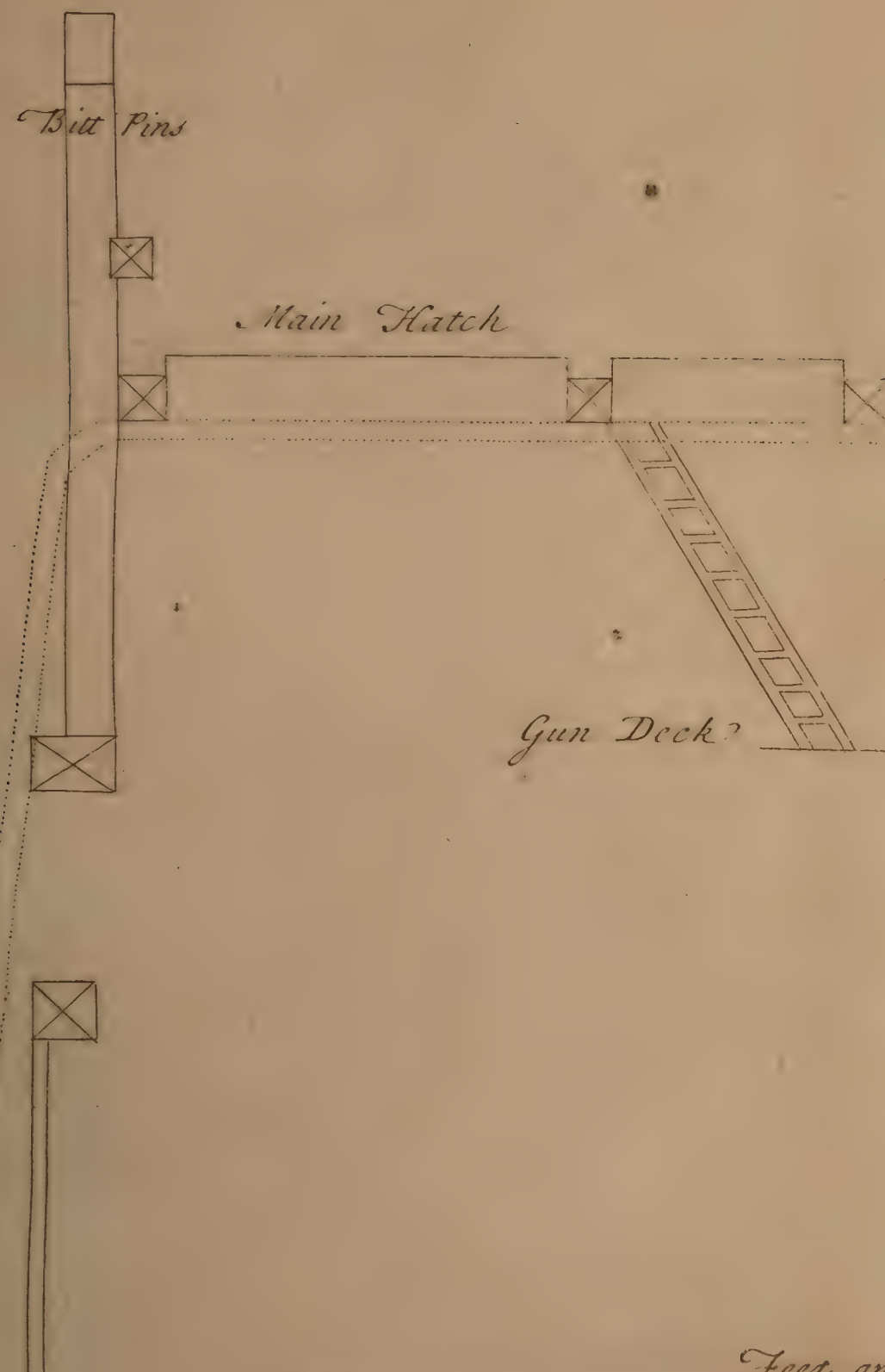
It is therefore proposed, that in order to clear the holds of ships of the bad air therein contained, the two holes abovementioned, that is, the fire-place and ash-place, be both closed up with substantial and tight iron doors; and that a copper or leaden pipe, of sufficient size, be laid from the hold into the ash-place, for the draught of air to come in that way to feed the fire. And thus it seems plain from what has been already said, that there will be from the hold a constant discharge of the air therein contained; and consequently, that that air so discharged must be as constantly supplied by fresh air down the

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hatches,

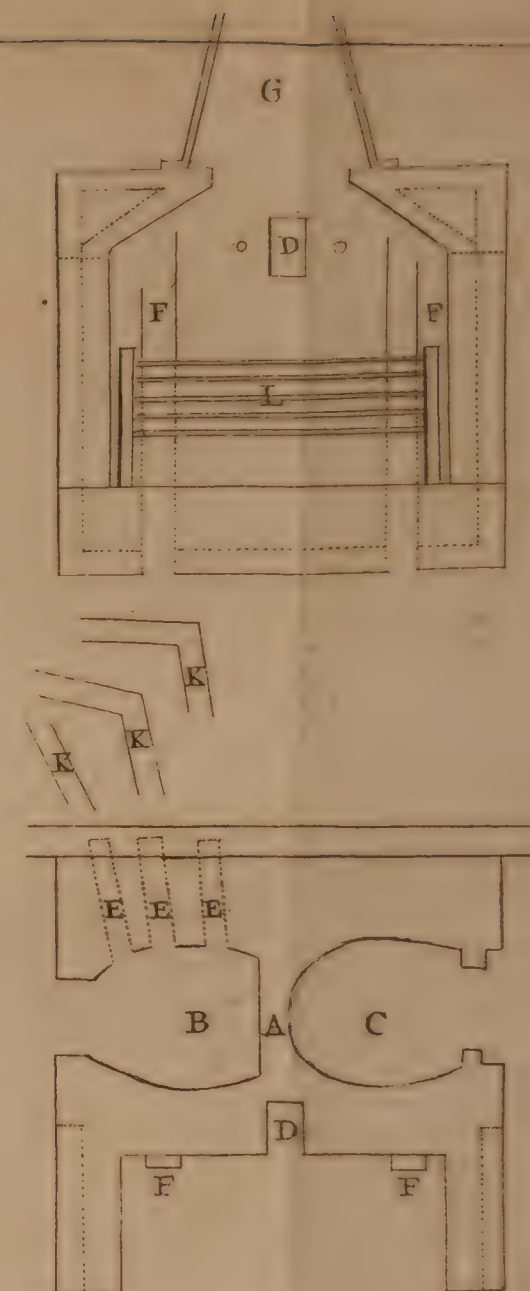
hatches, or such other communications as are open into the hold : whereby the same must be continually freshened, and its air rendered more wholesome, and fit for respiration.

And if into this principal pipe so laid into the hold, other pipes are let in, communicating respectively either with the well or lower decks ; it must follow, that part of the air consumed in feeding the fire, must be respectively drawn out of all such places, to which the communication shall be so made.

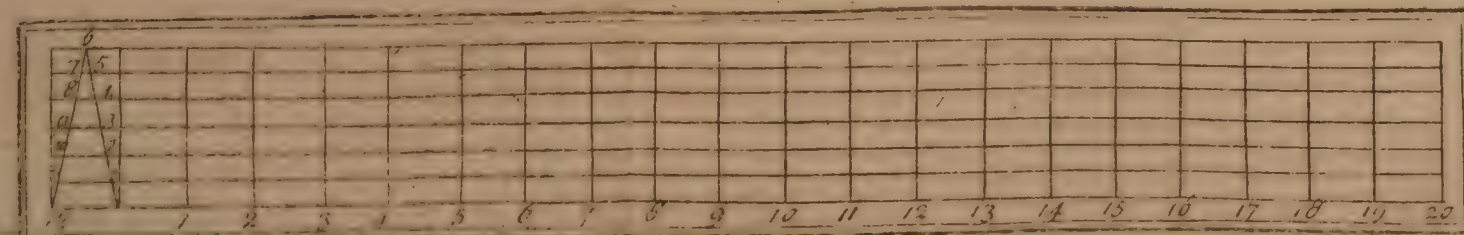


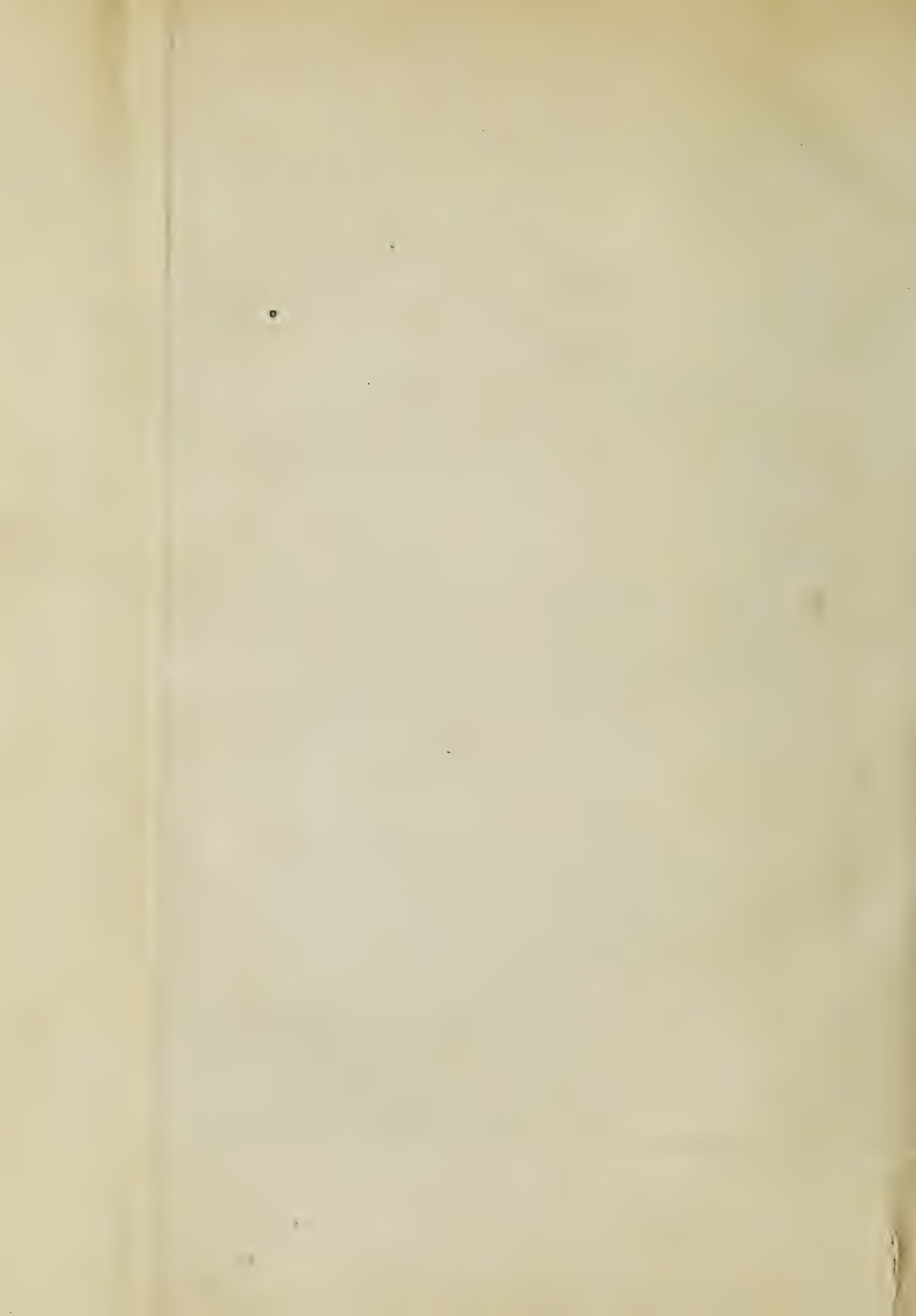
A Plan of the Brick Work of the Furnaces and Range of the Copper Pipes fixed as directed by M^r. Sutton, with the Section of the Range and Fire hole of the great Furnace shewing the outside Copper Pipe that lays on the Ashpitt with a Lead pipe fixed to it leading down the Ships Well hole within four feet and half of the Bottom.

- A. Plan of Furnaces
- B. Ash Pitt
- C. Oven
- D. Vent Hole
- E. Copper Pipes in the Ash Pitt
- F. D^o in the Range
- G. Section of the Range and Copper Chimney
- H. D^o Fire Hole under the great Furnace
- I. The outside Copper Pipe that is joined to the Lead Pipe
- K. The form of the Copper Pipe that is joined to the Lead Pipe
- L. The Grates standing between the Jambs in the Range



Feet and Inches.





T O

MARTIN FOLKES, Esq;

President of the royal society.

S I R,

‘ ACCORDING to my promise, I have herewith sent you my
 ‘ observations upon Mr. Sutton’s machine, which I drew
 ‘ up sometime since, and intended to lay before the royal society
 ‘ in December last, before I knew either that a model would be
 ‘ shewn by Mr. Sutton, or that Dr. Mead would have presented
 ‘ his account thereof. I am conscious of the disadvantages my
 ‘ slender performance must appear under after the reading of one
 ‘ upon the same subject from so celebrated a pen as Dr. Mead’s.

‘ These remarks were the result of several times seeing the
 ‘ machine, when first put in execution at Deptford. I hope it
 ‘ will not take up too much of the society’s time to read my
 ‘ paper this evening,’ and am,

S I R,

Your most obedient humble servant,

Aldersgate-street,
 Thursday Morning,
 April 1, 1742.

W. WATSON.

Some observations upon Mr. Sutton's invention to extract the foul and stinking air from the well and other parts of ships, with critical remarks upon the use of wind-sails, by William Watson, F. R. S.

London, Dec. 4, 1741.

Read April 1, 1742.

As nothing is more conducive to the health of the human body, than the taking a sufficient quantity of wholesome air into the lungs, so the contrary is attended with pernicious and often with destructive consequences.

One of the great uses of air in inspiration is to cool the blood passing through the lungs, where nature has provided, according to the excellent Malpighius, that the blood should be distributed through a vast number of exceedingly fine arteries, which occupy the thin vesicles of the lungs; and by this means the blood is exposed to the air under a prodigiously large surface, whereby the putrefaction is prevented, which, from the alcacescent quality of that fluid, would otherwise be speedily destructive.

Observations inform us, that contagious distempers are more frequent in hot climates than in cold; and in closely built cities full inhabited, than in towns: the former may, in some measure, proceed from the too great heat of the air, not fully answering the above-mentioned purposes; and the latter from too many people breathing in the same atmosphere, thereby rendering it unfit for respiration.

It has been frequently tried, that if a gallon of air be contained in a bladder, and by means of a blow-pipe, inspired and
expired

expired into the lungs of a man, without having any communication with the external air; in the space of a minute, or little more, it becomes heated, and unfit for respiration; and without the addition of fresh air, the person making the experiment would speedily be suffocated. The diving-bell is another instance of the same kind, wherein a constant supply of fresh air must be had, to keep out the water, and refresh the people included.

Although air is absolutely necessary to our existence, and necessity constrains us inevitably to breathe therein, it may be made a vehicle of most malignant poisons, as witness the famous Grotto del Cani in Italy, the poisoning air by charcoal, and air impregnated with the fumes of fermenting vegetable liquors. Stagnant air, either alone or mixed with water, soon becomes very offensive and pernicious; as in wells dug for the supply of water, and disused for some time; as is the air also in the wells and in the holds of ships, which is occasioned principally by what is usually called the bulge-water, which if the ship is tight, and not frequently pumped, becomes not only very offensive, but so extremely poisonous, as frequently to suffocate those seamen, who, as the pumps are subject to be clogged with filth, venture down to cleanse them; and will cause also in persons at a distance violent head-achs, cold sweats, and frequent vomitings, which continue more or less, in proportion to the distance from the well of the ship, when the injury was received, and the degree of putrefaction in the water and air.

The air, in ships particularly, is very liable to be vitiated, not only from the bulge-water, but from too many people breathing in the same atmosphere; especially in ships of war, hospital-ships, and those used in the Guinea trade for negroes; where a number of uncleanly people, being stowed too close together, heat the air, make it replete with noxious effluvia, destroy the particles therein adapted to cool the lungs, particularly the acid nitrous gas. This principle is abundant in cool air, and mani-

feels itself not only from the quantity of nitrous crySTALLIZATIONS, which may be collected from caverns of the earth, especially those open to a northerly aspect, but also from exposing pieces of the flesh of animals fresh cut, or their blood, whereby the colours of their surfaces are soon changed from a dark deep red to a more lively and florid one. Air robbed of this valuable property, and replete with hurtful ones, not only from the people, but from the stinking water in the well and lower parts of the ship, must produce the most putrid, if not pestilential fevers.

Although the æquilibrium within places confined is maintained by the external air, yet unless, by openings properly adapted, the air is suffered to pass freely enough, the external air proves as a stopple to the internal, and only mixes with that portion of it which is next in contact: this is evident from the common occurrence in privies, which are scarcely offensive in clear weather, but are much so in foul or windy, from a diminution of the incumbent pressure of the atmosphere, when the vapours that have been pent up, expand themselves to a considerable distance.

To prevent the abovementioned inconveniencies, and to preserve the healths and lives of the seamen, that valuable part of the nation, many schemes have been thought of; particularly the machines of those two very worthy ingenious and industrious members of this society, the Rev. Dr. Hales, and the Rev. Dr. Desaguliers; the first by an instrument which he calls the ship's lungs^a, and the latter by a machine^b, which is an improvement of the Hessian bellows; but as these have been laid before the society by the gentlemen themselves, I shall pass them over, and proceed to mention the contrivance commonly made use of, I mean the wind-fails. They are made of the common sail-cloth, and are usually between 25 and 30 feet long, according to the size of the ship, and are of the form of a cone ending obtusely; when they are made use of, they are hoisted by ropes to about
two

^a See Dr. Hales's Treatise of ventilators.

^b See Philos. Transf. N^o 437.

two thirds or more of their height with their basis distended circularly by hoops, and their apex hanging downwards in the hatchways of the ship; above each of these, one of the common sails is so disposed, that the greatest part of the air, rushing against it, is directed into the wind-sail, and conveyed, as through a funnel, into the upper parts of the body of the ship. These must be hung up and taken down every time they are used, and the supply by this method is not constant. Though custom has given a sanction to this device, it is subject to many inconveniencies: 1st, Each ship having commonly three of these, (one to each mast) the seamen are a considerable time in getting their apparatus ready, and in hoisting them up to make use of. 2dly, They can only be used in mild weather. 3dly, Near the equator, where fresh air is most wanted, there sometimes happen such stark calms, that they are useless by not having air enough to distend them. 4thly, The air hereby admitted passes only into the upper and more open parts of the ship, so that the well, &c. receive no change therefrom; and it is observed, that sometimes, upon using them after some discontinuance, they drive offensive air into the cabin, and more airy parts of the ship; like as the pouring some fresh into stinking water makes the whole stink, though in a less degree. 5thly, They are improper to be used in the night-time, when the people are sleeping between decks. And lastly, Admitting they had none of the former inconveniencies, their use must be destructive in hospital ships; where, though fresh air imperceptibly received, is absolutely necessary to preserve the crew as free as possible from the infectious breath and exhalations of the diseased and wounded seamen; yet blasts of wind, pouring impetuously into the very places where the sick lie, must be attended with such consequences as are too obvious to mention.

To remedy these inconveniencies, to prevent the air proving foul even in the wells and holds of ships, and to cause imperceptibly a large circulation of fresh air into every part of the ship

ship at all times, Mr. Sutton has invented the following scheme, which is useful not only in these cases, but, by altering some parts as particular places require, may be applied to houses, the close parts of prisons, wells at land, privies, hospitals, &c.

Nothing rarefies air so considerably as heat, which whenever it causes a diminution in the density of the air, that part next in contact will rush in, and be succeeded by a constant supply, till the air becomes of an equal degree of elasticity. Therefore, if a tube be laid in the well, hold, or any other part of the ship, and the upper part of this tube be sufficiently heated to rarefy the impending column of air, the æquilibrium will be maintained by the putrid air from the bottom of the tube, which being drawn out this way, a supply of fresh air from the other parts of the ship will succeed in its place, which operation, being continued, will intirely change the air in all parts of the ship. This principle, exactly conformable to the doctrines of pneumatics, is the basis of Mr. Sutton's machine, which being put in execution on board the hulk at Deptford, before the lords of the admiralty, commissioners of the navy, our very learned and ingenious president, M. Folkes, Esq; Dr. Mead, &c. performed to their satisfaction, in bringing air from the bread-room, horlop and well of the ship at the same time, in such quantity, that large lighted candles being put to the end of the tubes, the flame was immediately sucked out as fast as applied, though the end of one of the tubes was above twenty yards distant from the fire. The method is as follows :

To boil the provisions of the ship's company, they must have a copper, which is bigger or less, in proportion to the size of the ship, and number of the crew : this copper is fixed in ships in the manner as on land, having under it two openings divided by an iron grate. The first opening, having an iron door, is for the fire ; the ashes from the grate drop through into the bottom of the other ; the smoke passes through a chimney, and is discharged as usual. After the fire is lighted, it is supported by
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the air from the parts next the ash-pit; but having, contrary to the usual custom, adapted an iron door, like the former, made very tight, to prevent the ingress of air, the fire would soon be extinguished, if not supplied by some other aperture: in order to which, one or more holes are made through the brick-work in the side of the ash-pit; and tubes of lead or copper, fitted closely in the holes, and made fast, are laid from thence into the well, and other parts of the ship; by which means the air next the bottom of the tubes rushes through them, and the foul and stinking air succeeding is transmitted through the fire, and passes off, without offending, by means of the chimney; and a supply of fresh air from the other parts of the ship continually fills the place of the former, the fire requiring a constant support. This support will be wanting, not only during the continuance of the fire, but while any warmth remains in the fire-place, copper, or brick-work, as was observed on board the hulk at Deptford, where the draught of air through the tube lasted above twelve hours after the fire was taken away. This being considered, as the dressing the provisions for a number of people will take up some hours every day, the warmth of the brick-work and flues will continue a draught of air from one day to the next. Mr. Sutton proposes thus to circulate the air by the same and no greater expence of fire than is customarily used for the necessities of the ship.

The operation of the machine will be equally useful in large as in small ships; for the greater the number of people they have on board, the larger quantity and longer continuance of the fire will be necessary to dress the provisions; and therefore there will be required a greater quantity of air to support that fire. The size and number of the tubes need not be specified; because as the circulation of air is in proportion of the quantity of fire; the wider the tube, and greater the number of them, the less the velocity of the air, and vice versa.

I several times took notice in this machine, when, for the sake of observation, after the fire was well lighted, the lowest iron door was left open, that the flame did not ascend so high, or burn so fierce; but immediately upon shutting thereof, when the draught of air was only through the tubes, the flame soon recovered its former vigour.

There is likewise, especially in large ships, not only a copper, but also a fire-grate like those used in kitchens: that the heat and smoke of this also may not be useless, an iron tube may be fixed behind the grate, and inserted quite through the brick-work, and through the deck, so that one end thereof will stand about a foot, or little more, in the chimney above the brick-work, and the other will enter into the hold, or any other part of the ship; the upper end of this tube then being heated, the draught of air will be supplied from below, as in the other case. This likewise was tried on board the hulk, with an iron tube about two inches and an half in diameter, and the lighted candles held at the bottom of this tube were extinguished as fast as by any of the others.

It may be objected, that a number of tubes take up too much room, especially in merchants ships, and are subject to be broken or injured by loading or unloading: to remedy which it is advisable, that only one tube of a convenient size be made fast unto the side of the ash-pit, and, as soon as it comes through the main deck, to compress it (a circular or any other form being equally useful) not too close; and it may be divided into as many ramifications as may be thought necessary, (especially as the bread-room, store-room, &c. cannot be kept too sweet, a branch for each of these) and these branches may be carried between the beams which support the deck, till they come to the side of the ship, and there be let down likewise between the beams into the places intended; by which contrivance their operation will not in the least be obstructed, and the tubes be secured from any accident.

The simplicity of this machine, it being so little cumbersome, its operation without any labour to the seamen, the small expence to put it in execution, and maintain it, besides the before-mentioned considerations, are other arguments for its general use.

Continuation of the historical account of a new method, &c.

S I R,

SINCE my first letter to you, giving an historical account of my method for extracting foul air out of ships, &c. I have made such improvements in it, that I am convinced it is now perfect, and will produce all the benefits that can be expected from a free circulation of fresh air in close places; without any of those imaginary inconveniences, that by some few were apprehended from it. And my conviction does not arise from the truth of the principles alone, on which it is founded; but likewise from impartial experiments made with my machine during long voyages in several parts of the world; and ample testimonials of its salutary effects, wherewith I have been honoured; the most material of which you will find at the foot of this letter.

I have now the satisfaction to inform you, that my invention has at length surmounted all obstacles through the wisdom and zeal of the present right honourable the lords of the admiralty, and the right honourable and honourable the principal officers and commissioners of his majesty's navy, who, having taken the whole affair into their serious consideration, were so thoroughly satisfied of the great advantages that must accrue to the nation from the faithful execution of my scheme; that the said principal officers and commissioners of his majesty's navy have con-

428 EXTRACT FROM THE RIGHT HONOURABLE THE
tracted with me for fixing my engine on board his majesty's
ships, whether laid up, or in commission : for which act of ge-
neral concern, as I well know the warmth of your heart for the
good of our country, I doubt not but you will readily concur
with me in making cordial acknowledgments to their lordships,
and those honourable gentlemen in the name of the publick.

Your's, &c.

SAMUEL SUTTON.

Extract from the right honourable the lord Anson's
Voyage round the world, p. 36. of the edition in
4to, shewing the want of an engine to extract the
foul air.

THE captains of the squadron represented to the commo-
dore, that their ships companies were very sickly, and
that it was their opinion, as well as their surgeon's, that it would
tend to the preservation of the men to let in more air between
decks ; but that their ships were so deep, they could not possibly
open their lower ports. On this representation, the commo-
dore ordered six air-scuttles to be cut in each ship, in such places
where they would least weaken it.

And on this occasion I cannot but observe, how much it is the
duty of all those, who either by office or authority, have any in-
fluence in the direction of our naval affairs, to attend to this im-
portant article, the preservation of the lives and health of our
seamen. If it could be supposed, that the motives of humanity
were insufficient for this purpose ; yet policy, and a regard to
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the success of our arms, and the interest and honour of each particular commander, should naturally lead us to a careful and impartial examination of every probable method proposed for keeping a ship's crew in health and vigour. But hath this been always done? Have the late invented plain and obvious methods of keeping our ships sweet and clean, by a constant supply of fresh air, been considered with that candour and temper which the great benefits promised thereby ought naturally to have inspired? On the contrary, have not those salutary schemes been often treated with neglect and contempt? And have not some of those, who have been entrusted with experimenting their effects, been guilty of the most indefensible partiality, in the accounts they have given of these trials? Indeed, it must be confessed, that many distinguished persons, both in the direction and command of our fleets, have exerted themselves on these occasions with a judicious and dispassionate examination, becoming the interesting nature of the inquiry; but the wonder is, that any could be found irrational enough to act a contrary part, in despite of the strongest dictates of prudence and humanity. I must however own, that I do not believe this conduct to have arisen from motives so savage, as the first reflection thereon does naturally suggest: but I rather impute it to an obstinate, and in some degree superstitious, attachment to such practices as have been long established, and to a settled contempt and hatred of all kinds of innovations, especially such as are projected by landmen, and persons residing on shore.

Testimonials of the advantages and success of my machines for purifying the air in ships, and other close places.

N U M B. I.

Extract of a letter from rear-admiral Boscawen to Mr. Corbett, dated in Table-bay, 9th April, 1748.

THE squadron, as well as the troops, who are with me, are surprisingly healthy, and have been so in general our whole passage: which I attribute in a great measure to our having touched at the islands, where I procured refreshment.— But at the same time I cannot help thinking, the air-pipes fixed in the men of war have been of great service in this particular, by purifying the air between decks, and thereby preventing the scurvy.

In addition to what I have said above of the air-pipes, I cannot help observing to their lordships, that the bulge-water on board the *Namur* in particular, has not been the least offensive the whole passage; though it was so bad when we last went into Portsmouth harbour, that three or four men were like to be suffocated, by only coming near the well: and therefore I cannot but recommend them as things highly useful on board his majesty's ships.

N U M B. II.

MR. Joseph Hatton, carpenter of the *Warwick* man of war, during her voyage to Guinea, and the West-Indies, mentioned above, p. 19, declared at the navy-board, that on the accident

accident of breaking the chain of their pump, it fell with a kink in the chain, so that it could not be got up or down; wherefore he was obliged to go into the well, in order to cut a scuttle in the pump to clear the kink: that he remained in the well near five hours in a considerable depth of water, without any ill effect on his health; which he imputes to the pipes being fixed on board the said ship, for extracting the foul air.

N U M B. III.

CAPTAIN Petre, commander of the Sandwich, in the service of the East-India company, on board of which ship Mr. Sutton had constructed one of his machines, declared at the navy-board, that on his return from a China voyage in 1747, when he put in at Ireland, he ordered some of the bulge-water to be brought up; and it differed not in smell from other common sea-water, but differed in colour as the liquor of bohea from green tea.

N U M B. IV.

Extract of a letter from captain William Lisle, commander of his majesty's ship the Vigilant, at the Cape of Good Hope, April the 10th, 1748.

I GAVE you an account of all that occurred till I left Madeira, in a letter from thence: however, that you may form a better idea of the tedious passage to this place, I shall just mention the dates of our departure from the several ports we touched at in our passage. We left Spithead the second of November, Lisbon the twenty-fourth of January, and arrived at the Cape of Good Hope the twenty-second of March; by which you may observe, that our passage from Madeira to this place was just eleven weeks, and our whole voyage from England full
five

432 AN ABSTRACT OF THE LETTERS PATENT,
five months, if we fix each month at twenty-eight days : which
is a long time to be getting but little more than half-way to our
journey's end ; but though long, yet it has been attended with
very few bad circumstances : and particularly in regard to the
health of the several ships companies, and all the troops in ge-
neral, never were people more healthy ; which I cannot but sup-
pose is entirely owing to the new-invented ventilators^c, and the
large quantity of mustard-seed allowed by the government to the
seamen, by way of experiment. The Dutch who reside here,
speak of it as a miracle, and make it the chief subject of their
conversation.

An abstract of the letters patent, granted by his
majesty, for the aforesaid invention.

G EORGE the Second, by the grace of God, of
Great Britain, France, and Ireland, king, defender of
the faith, &c. **To all**, to whom these presents shall
come, greeting, **Whereas** our trusty and well-beloved Samuel
Sutton, of our city of London, brewer, hath, by his petition,
represented unto us, that he has after long study, much pains,
great expence, and repeated experiments, found out, and brought
to perfection, a new invention or method for extracting foul air
out of ships by means of fire, and will equally contribute to the
removing of all noxious air whatsoever, and may be conveni-
ently applied to mines and caverns in the earth, dungeons, pri-
sons, and all infected places ; that the said invention may be
used in hot-houses and walls, which will greatly warm the earth,
for the speedy production of its fruits, and also in granaries for
the preservation of corn and grain ; that the said invention will
greatly

^c N. B. These are Mr. Sutton's air-pipes.

greatly tend to the preservation of the lives of great numbers of our subjects, and be of publick use and benefit to this our kingdom in general : and as the petitioner is the first and sole discoverer of the said invention, or method, and also, in regard to the great expence of money and time, the petitioner has sustained, in making so valuable a discovery ; he therefore most humbly prays us, that **We** would be pleased to grant him our royal letters patent, for the sole use and benefit of his said new invention, within that part of our kingdom of Great Britain called England, and the dominion of Wales, and town of Berwick upon Tweed, and in our plantations in America, for the term of fourteen years, according to the statute in such case made and provided : **We** being willing to give encouragement to all arts and inventions, which may be for the publick good, are graciously pleased to condescend to the petitioner's request. **Know** ye therefore, that **We** of our especial grace, certain knowledge, and meer motion, **have** given and granted, and by these presents for us, our heirs and successors, **do** give and grant unto the said Samuel Sutton, his executors, administrators, and assigns, our especial licence, full power, sole privilege, and authority, that he, the said Samuel Sutton, his executors, administrators, and assigns, and every of them, by himself, and themselves, or by his and their deputy or deputies, servants or agents, or such others as he the said Samuel Sutton, his executors, administrators, or assigns, shall at any time agree with, and no others, from time to time, and at all times hereafter, during the term of years herein expressed, shall and lawfully may make, use, exercise, and vend his said invention, within that part of our kingdom of Great Britain called England, our dominion of Wales, and town of Berwick upon Tweed, and our colonies and plantations in America, in such manner, as to him the said Samuel Sutton, his executors, administrators, and assigns, or any of them, shall in their discretions seem meet : **and** that the said Samuel

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Sutton,

Sutton, his executors, administrators, and assigns, shall and lawfully may have and enjoy the whole profit, benefit, commodity, and advantage, from time to time, coming, growing, accruing, and arising, by reason of the said invention, for and during the term of years herein mentioned, **To have, hold,** exercise, and enjoy the said licence, powers, privileges, and advantages herein before granted, or mentioned to be granted, unto the said Samuel Sutton, his executors, administrators, and assigns, for and during, and unto the full end and term of fourteen years, from the date of these presents next, and immediately ensuing, and fully to be compleat and ended, according to the statute in such case made and provided. **And** to the end, that he the said Samuel Sutton, his executors, administrators and assigns, and every of them, may have and enjoy the full benefit, and the sole use, and exercise, of the said invention herein before declared; **We** do by these presents, for us, our heirs and successors, require, and strictly command all and every person, and persons, bodies politick and corporate, and all other our subjects whatsoever, of what estate, quality, degree, name, or condition soever they be, within that said part of our kingdom of Great Britain, called England, our dominion of Wales, and town of Berwick upon Tweed, and our colonies and plantations in America aforesaid, that neither they, nor any of them during the continuance of the said term of fourteen years hereby granted, either directly, or indirectly, do make, use, or put in practice the said invention, or any part of the same so attained unto by the said Samuel Sutton as aforesaid, nor in any wise counterfeit, imitate, or resemble the same, nor shall make, or cause to be made, any addition thereunto, or subtraction from the same, whereby, to pretend himself, or themselves the inventor or inventors, deviser or devisors thereof, without the licence, consent, or agreement of the said Samuel Sutton, his executors, administrators, or assigns, in writing under his or their hands and seals, first had and obtained

in that behalf, upon such pains and penalties as can or may be justly inflicted on such offenders, for their contempt of this our royal command; and further, to be answerable to the said Samuel Sutton, his executors, administrators, and assigns, according to law, for his and their damages thereby occasioned. **And moreover we do** by these presents for us, our heirs and successors, will and command all and singular the justices of the peace, mayors, sheriffs, bailiffs, constables, headboroughs, and all other officers, and ministers whatsoever of us, our heirs and successors, for the time being, that they or any of them do not, nor shall at any time hereafter, during the said term hereby granted, in any wise molest, trouble, or hinder the said Samuel Sutton, his executors, administrators, or assigns, or any of them, or his, or their deputy, servants, or agents, in or about the due and lawful use or exercise of the aforesaid invention, or any thing relating thereto.

And lastly, We do by these presents, for us, our heirs and successors, grant unto the said Samuel Sutton, his executors, administrators, and assigns, that these our letters patent, or the inrollment or exemplification thereof, shall be in and by all things good, firm, valid, sufficient and effectual in the law, according to the true intent and meaning thereof, and shall be taken, construed, and adjudged, in the most favourable and beneficial sense, for the best advantage of the said Samuel Sutton, his executors, administrators, and assigns, as well in all our courts of record as elsewhere, and by all and singular the officers and ministers whatsoever of us, our heirs and successors, in that part of our said kingdom of Great Britain called England, or dominion of Wales, and town of Berwick upon Tweed, and our colonies and plantations in America aforesaid, and amongst all and every the subjects of us, our heirs and successors, whatsoever and wheresoever, notwithstanding the not full and certain describing the nature or quality of the said invention, or of the materials thereto

436 AN ABSTRACT OF THE LETTERS PATENT, &c.
conducting and belonging. **In witness** whereof we have caused
these our letters to be made patent. **Witness** ourself at West-
minster, the sixteenth day of March, in the seventeenth year of
our reign.

By writ of privy seal.

C O C K S.

A DIS-

A

DISCOURSE

ON THE

SCURVY.

THE Scurvy is a name given to so many disorders of the body seemingly of a different kind, that it may justly be said to be a manifold and complicated disease. The chief symptoms of it however are clearly described by several authors, which are such as these: the gums rot first; then the skin is defaced with livid and black spots; ulcers ensue, especially in the swelled legs; and these are with difficulty, if ever, cured. In the last stage of the distemper, even the bones become carious.

It is therefore very plain, that this malady is a kind of corruption of the blood, and the whole mass of the bodily humours. This, when the cause is long continued, increases to a degree of putrefaction. All writers are agreed in their opinion, that it is a northern disease; imputing it to the cold and moist air of those climates, together with the use of stagnating and saltish waters, and the unwholesome food of hard, dried, and salted meats. They therefore observe that it rages most, even to be, in a manner universal, among the inhabitants of the Baltick sea, in Finland, Norway, Denmark, and the places adjacent to the Germanick ocean. And indeed not only the new Latin name, scorbutus,

butus, but our English one too, is plainly made from the Saxon *ſchorbock*, or *ſchorbuck*, denoting a griping or tearing of the belly ^a.

This is the ſame diſtemper, which Pliny, from the ulcers in the mouth and legs, calls by the name of *ſtomacace*, (or rather *ſtomocace*) and *ſceletyrbe*; aſcribing it to the drinking of bad waters; and for which, he ſays, the *herba Britannica*, which is our *hydrolapathum*, or water-dock, was found to be a remedy ^b.

But long before this, Hippocrates ^c himſelf took notice of this diſeaſe, as a diſtemper of the ſpleen, proceeding very much from cold, raw, and turbid waters.

Such is this diſtemper at land. At ſea, in long voyages, it is much more violent; ſo far, that many are of opinion, that upon the two elements it is a malady of a different kind. But it plainly appears from comparing what has been ſaid of that at land, with what I am going to mention of the ſame at ſea, that the difference is only in the degree of malignity.

The hiſtory of the progreſs of this cruel enemy is ſo judiciously and exactly related in lord Anſon's Voyage round the world ^d, when he came into the South ſea, where his men were in a moſt terrible manner afflicted with it, that I cannot give a more lively deſcription of it, than by taking out of this moſt entertaining and inſtructive book the moſt material circumſtances, which occurred in its ſeveral ſtages. This I am the better enabled to do, becauſe being incited by the extraordinary events to make a full enquiry into this whole affair, I have not only had the honour of diſcourſing with his lordſhip upon it, but have alſo been favoured with the original obſervations of his two ingenious and ſkilful ſurgeons ^e, from which I have leave to tranſcribe whatever I find to my purpoſe.

The

^a Vid. *Eugalen de Scorbuto*, & in primis *Sennert. Lib. iii. Part v.*

Hiſtor. Lib. xxv. Sect. vi.

Aquis & Locis. Sect. x.

Allen.

^b *Nat. Hiſtor. Lib. xxv. Sect. vi.*

^c *De internis Affection. Sect. xxxiv. & de Aërib.*

^d *Pag. 100, &c.*

^e *Mr. Ettrick and Mr.*

The first appearances are much the same in the two diseases at land and at sea; but at sea they soon run to a much higher degree. Nothing is more surprising than the malignity of this, as it were corrosive, poison, exerting itself so far, that the scars of wounds, which had been many years healed, were often forced open again. Nay the callus of broken bones, which had been completely formed for a long time, was found dissolved, and the fracture seemed as if it had never been consolidated.

This malady was likewise accompanied with many other dangerous symptoms, particularly putrid fevers, pleurifies, the jaundice, an obstinate costiveness, and, at the latter end, a difficulty of breathing. This last was found to be the most deadly of them all: for it never was without such a faintness and weakness, that many expired upon the least motion, and endeavouring to get out of their hammocks, died before they could reach the deck.

Moreover, a strange dejection of the spirits, with shiverings, tremblings, and dreadful terrors on the slightest accidents, was so constant an attendant, that whatever discouraged the sick never failed to add new force to the distemper.

Such are the strokes of this compounded calamity; and many more might be enumerated: but it is time to proceed, and to inquire into the manner, by which they are produced.

It is certain, that such bad diet as has been mentioned, will corrupt the blood and humours; but nothing is clearer from the whole history of this voyage, than this, that the air is, even more than any other agent, concerned in bringing on the mischief^f. It may indeed justly seem strange, that the writers of physick should not have observed so remarkable a cause; but they described the land scurvy only. Nay, so great was the efficiency of the aërial fluid, that even a warmer climate did not mitigate the scorbutick virulency; neither did fresh provisions, and plenty of wholesome rain-water avail; although these are certainly of great importance in preserving the body from the fatal disorder.

Of

^f See Voyage, p. 294.

Of so much consequence it is to resist the first approaches of an enemy.

Now the manner, in which the aforesaid causes act, is this. Whoever understands the use of respiration, and the way by which the several offices necessary to life are performed by means of it, will readily comprehend how the sea air acquires such noxious qualities.

To set this in a clear light, it must be observed, that air entering into the lungs does by its gravity and elasticity press upon the blood circulating in the vessels there. The effect of this pressure is two-fold; first, a comminution and division of it into smaller particles; secondly, some subtle elastick matter passes into the blood, and exciting in it an intestine motion, disposes and prepares it for the secretions of several liquors, when, in its course round the body, it arrives at the glands contrived for the separation of such and such juices.

Whatever therefore alters this gravity and elasticity, makes the air unfit for the purposes, for which it was designed. In the first place, moisture weakens its spring; next, a combination of foul particles, such as are contained in the breath of many persons crowded together, and some perhaps diseased; then, the filthiness of water stagnating in the bottom of the ship; lastly, salts imbibed from the sea, some of which may probably have proceeded from putrefied animals in that element, may insinuate themselves into the blood, and, in the nature of a ferment, corrupt its whole mass. Neither is it amiss to add, that the animal spirits themselves must necessarily partake of the vitious disorder of the fluid, from which they are derived. This is plain from that unaccountable faintness, and weakness of the body, and dejections of mind, which, as we have before taken notice, accompany the other symptoms.

It is needless to shew how all the enumerated complaints, and indeed many more, may follow upon such a disturbed state of things, especially when the other mentioned causes concur.

It

It may be very satisfactory to put down the observations, which the above-named surgeons made upon the blood of their patients, and upon the dissection of dead bodies, in the several stages of the distemper.

In the beginning, as it flowed out of the orifice of the wound, it might be seen to run in different shades of light and dark streaks. When the malady was increased, it ran thin, and seemingly very black, and after standing some time in the porringer, turned thick, of a dark muddy colour, the surface, in many places, of a greenish hue, without any regular separation of its parts. In the third degree of the disease, it came out as black as ink, and though kept stirring in the vessel many hours, its fibrous parts had only the appearance of a quantity of wool or hair floating in a muddy substance.

In dissected bodies, the blood in the veins was so entirely broken, that by cutting any considerable branch, you might empty the part, to which it belonged, of its black and yellow liquor. When found extravasated, it was of the same kind. And lastly, as all other kinds of hæmorrhages are frequent at the latter end of the calamity, the fluid had the same appearance, as to colour and consistence, whether it was discharged from the mouth, nose, stomach, intestines, or any other part.

The effects we mentioned of the violence of the scorbutick humour being so malignant as to open the scars of old wounds, and dissolve the calli of fractured bones, which had for a long time been formed, appear to many to be quite incredible; the rather, because, as they commonly say, a bone thus reunited is stronger in that part than in any other of the same joint. This indeed, I dare venture to affirm, is not true in fact. The case is thus: a callus is no more than a kind of cementation made by filling up the space between the broken ends of the bone, with the nutritious juice from the part. This when nicely examined, is found to be more porous, and to have less solidity,

though the bone often appears bigger than the part above and below it; the fibres are smaller, shorter, and not so regularly disposed as in the natural texture. In short, a callus is an imperfect ossification. For this reason, when the nutritious particles themselves have acquired a corrosive acrimony, they may, like a menstruum, work upon and break the texture of this super-added cement. Which is indeed a most surprising phenomenon.

It is proper after all to observe, as a confirmation of this reasoning, that although the callus is dissolved by the disease, yet upon the patient's recovery, it is gradually formed again, in proportion to his coming to a right habit of body. I have before me a remarkable instance of this kind. A sailor had one of his clavicles fractured in December, which was immediately reduced, and soon united. The dressings were taken off in January, and he made use of his arm as before. In the following April, as he was suspending his body by the arms, the same clavicle was disunited, and the callus gave way as at first. He at that time complained of some symptoms of the Scurvy; which daily increased till June following. At that time he was carried ashore at the island of Juan Fernandez. The bandages being removed, the fracture appeared in the same condition as when the accident first happened, without the least remains of a callus: notwithstanding the proper applications he could not use his arm, until the middle of October; the callus having continued more than three months in a flexible state. From that time, by the use of a vegetable diet, and living on shore, he gradually recovered from the distemper; the callus was confirmed, and his usual strength returned.

But it is time to come to the cure; which will be, first to prevent the attacks; and in the next place, to remove the effects of this virulent evil.

The first care to be taken is of the diet. And here I must take the liberty to make some observations upon the manner of victualling our ships. The trials already made, as I have been informed, of Mr. Lowndes's salt made from brine, prove it to be much preferable, for salting provisions, both flesh and fish, to that made from sea-water, even to the bay-salt. Some experiments of its use I have made myself; and our college, being consulted by the lords of the admiralty, gave their opinion in its favour. There is in this nothing of that noxious quality, whatever it be, which is always found in the marine salt, and cannot, by any known methods, be separated from it; and which, as we see, makes the sea air, as well as its water, unwholesome. And I cannot but say, that I am sorry to see some of our physicians, of late years, so fond of prescribing the drinking of it to their patients, particularly in scrophulous distempers. I am well assured, that it has sometimes brought on scorbutick symptoms, besides other mischiefs.

I must add, that if, instead of our salt-fish, stock-fish, which is dried without any salt, were provided, it would be more wholesome. The Dutch do so; and also, in lieu of oatmeal, they put on board gort, which is, as I have been informed, a kind of barley ground; and is not so hot and drying as oatmeal.

I will here relate what that experienced and brave admiral, Sir Charles Wager, once told me in a discourse I had with him concerning the health of our seamen. He said, that one year, when he commanded our fleet in the Baltick, his sailors were terribly afflicted with the Scurvy; but he observed that the Dutch ships, then in company with ours, were much more free from this disease. He could impute this to nothing but their different food, which was stock-fish and gort; whereas ours was salt-fish and oatmeal. He was then come last from the Mediterranean, and had, at Leghorn, taken in a great quantity of lemons and oranges. Recollecting, from what he had often heard,

how effectual these fruits were in the cure of this distemper, he ordered a chest of each to be brought upon deck, and opened every day. The men, besides eating what they would, mixed the juice in their beer. It was also their constant diversion to pelt one another with the rinds; so that the deck was always strewn and wet with the fragrant liquor. The happy effect was, that he brought his sailors home in good health.

It is very commonly known, that, in our East-India ships returning home, the men are very much affected this way, and that upon their very approach to the island of St. Helena, they are strangely relieved by the fresh odoriferous air; and perfectly recovered, after some days, by eating the fruits we have mentioned, and living chiefly upon the vegetables, which kind nature has supplied that place with in profuse plenty.

What has been said may serve for a very good proof of the reasonableness of the advice given some years ago, by our college, to the lords of the admiralty, viz. that a quantity of wine-vinegar should be allowed to the company of every ship. This qualifies the salt of the food, and makes some amends for the want of sub-acid fruits. But I must remark, that the vinegar of strong beer has neither the flavour nor the virtue of that from wine; and ought indeed to be forbidden our tables.

I shall conclude what I have to say with regard to feeding on herbs, in the Scurvy, with a remarkable relation, contained in a book published, not many years since, by a Dutch physician, on this subject §. A sailor, in one of the Greenland ships, was so intirely broken, and disabled by this disease, that his companions, when the fishing was over, put him into a boat, and sent him ashore; leaving him there to perish, without the least expectation of a recovery. The poor wretch had quite lost the
use

§ Observationes circa scorbutum, auctore Johanne Fred. Bachstrom. Lugduni Batavor. MDCCXXXIV. 12mo. p. 8.

use of his limbs; he could only crawl about upon the ground: this he found covered with a plant, which, having nothing else to support life, he, continually grazing like a beast of the field, plucked up with his teeth. Every country is, by the bounty of providence, provided with antidotes against the diseases, to which its inhabitants are chiefly liable. In a short time, he was by this means perfectly recovered to his strength, and after his return home, related the fact to this writer. It was soon after observed, that this herb was *cochlearia*, or scurvy-grass. Some of it was, for inquiry's sake, brought over hither in pots, and was found to be somewhat different from that of our country, being more mild, and not so pungent and sharp.

Thus much for the vegetable diet. I must add, that besides the herbs and fruits mentioned, there are many others very wholesome in this disease. Some like *cochlearia*, of a subtle and volatile juice, as the *nasturtium*, *beccabunga*, or *brooklime*; others more cooling, and therefore more proper in hot constitutions, or feverish heats, as *sorrel*, *endive*, *lettuce*, *purslain*, &c. And indeed, I think it will be best to join in use the hotter with the colder, that they may qualify each other; especially, because the acid fruits were found, in lord Anson's voyage, to be of most extraordinary benefit ^h.

Neither ought it to be omitted, that milk of all kinds, when it can be had, and its whey, which may be clarified with some of the herbs now named, is an antiscorbutick food and physick.

But, as the design of this discourse is to demonstrate the usefulness of the preceding machine, it will be right to add some illustrations and observations to those I formerly made in my paper read before the royal society, and reprinted in Mr. Sutton's book ⁱ.

I have

^h See Voyage, p. 117. and also p. 308.

ⁱ Page 41.

I have already taken notice, that the reason why the writers upon this disease have not ascribed it more to the air, than they have done, must be, because they were more acquainted with it at land than at sea. Now, it is very plain, that as the hurtful qualities of the sea-air must be heightened by its being closely confined, without due circulation, particularly when it is also saturated with effluvia from the breath of many persons almost stifled up together; so the continual shifting and changing of this element, must of course be attended with great advantages; nay such perhaps, as one unacquainted with the nature of things, would hardly be brought to believe. But I refer to my mentioned paper, and Mr. Sutton's additions.

I must lastly remark, that it is almost incredible how soon the sick, even though just dying, begin, when brought ashore, to feel the salutary effects of the land: for whereas the admiral had buried twenty-one men in two days, before his arrival at the island of Tinian, yet he did not loose above ten, during his two months stay there^k. For so healing, and contrary to the malignity and bad qualities of the sea-air, was that of the land, that the patients, even upon their being exposed upon the ground, immediately recovered.

But it may seem still more marvellous, that the vapour of the cold earth itself should also contribute to their speedy recovery. Lord Anson told me, that one of his men, who rowed the boat ashore, was so weak, that he fell down at the oar almost dead: when landed, the poor man desired his mates that they would cut a piece of turf out of the soft ground, and put his mouth to the hole: upon doing this, he came to himself, and grew afterwards quite well. This puts me in mind of what I have formerly seen done by the boys on Shrove-Tuesday, the too cruel anniversary martyrdom of cocks; when one of these crea-
tures

* See Voyage, p. 307.

tures was knocked down and expiring, it was sometimes brought to life again, by instantly putting its head, for a short time, into a fresh-made hole in the earth.

This sudden good effect of fresh air affords a plain proof of what we have before said, that besides the blood, the animal spirits themselves are very much affected in this disease: for such immediate relief could only be given by the means of this active fluid, the main instrument of all vital motions. And as the protracting this advantage in the open air is the cure at hand; so the making a constant circulation even of that, which is not so wholesome, in the ship, must do a great deal towards the prevention of the distemper.

R. M.

MEDICAL

M E D I C A L
P R E C E P T S
A N D
C A U T I O N S.

P R E F A C E.

I HAVE persuaded myself, that I should perform a work, neither entirely void of use, nor foreign to the duties of my profession, if I made the publick partakers of the principal helps against most diseases, which I had either learned by long experience, or deduced from rational principles. But my purpose is to lay down precepts of the art, and methods of cure, rather than definitions and descriptions of diseases; and to propose medicines confirmed by practice, not mere conjectures. And as it is not my intention to write a complete system of medicine, I shall not strictly confine myself to the usual order observed in medical treatises; for at my leisure hours I have perused my loose papers, and from them have extracted such things, as I thought might prove useful hereafter; at the same time calling in my memory to my assistance for whatsoever I had observed to be serviceable, or prejudicial, in each particular distemper. For such was the rise of medicine, by the recovery of some patients, and the loss of others, gradually distinguishing pernicious from salutary things^a. Wherefore

M m m 2

^a Sic medicinam ortam, subinde aliorum salute, aliorum interitu, perniciosam discernentem à salutaribus. Celsus in Præfat.

fore I shall not enquire into the very constitution (if the expression may be allowed) of the medical art; nor enter into the dispute, how far it is either rational or empirical: on which topicks I refer my readers to Celsus, who has stated the arguments of physicians for their respective sects with great candour, and sums up the whole by delivering his own opinion with equal judgment and perspicuity^b. Nor is this little work, which has been often interrupted by, and partly composed amidst the hurry of business, thrown out as a bait to catch fame. For it has long since been observed by the great parent of medicine, that our art has acquired more blame than honour^c. And indeed it is the general temper of mankind, to be excessively profuse of their reproofs, of their commendations extremely parsimonious. But this complaint made in behalf of medicine will probably appear slight, if compared with the following, which he makes in another place: that the physician has dreadful objects before his eyes, very disagreeable subjects in his hands, and takes great uneasiness to himself from the calamities of others^d. Now, what can be more humane, or more worthy even of a christian, than to declare, that he feels the calamities of others as sensibly, as if they were his own.

However, the very nature of my design compelled me to take notice of the errors of other physicians; but

^b Ibidem.

^c Ἐγωγε δοκέω πλείονα μεμψιμοιρίαν, ἢ τιμὴν κεκληρωῖσθαι τὴν τέχνην. Hippocrates in epist. ad Democritum.

^d Ὁ μὲν γὰρ ἰηρὸς ὁρᾷ τὰ δεινὰ, θιγάνει τε ἀνθρώπων, καὶ ἐπ' ἀλλοτρίῃσι ξυμφορῇσι ἰδίας καρπᾶται λύπας. Lib. de flatibus.

but I have been very careful throughout the work, to do it with the same equity, with which I would desire to have my own faults corrected. Our art is frequently obliged to rely on conjectures; nor is it to be expected that any one person will constantly hit the mark. And therefore I have not been ashamed to acknowledge, and put my readers in mind of, some errors, which I have committed either through ignorance, or want of due attention. For, as Celsus says, a plain confession of a real error is commendable, and more especially in that performance, which is published for the benefit of posterity^e. The reader will easily perceive, that I have endeavoured not only to express the sense of Celsus, but to employ his very words and phrases, or close imitations of them at least, whenever the subject would allow it; and I heartily wish I could have done it more frequently. For what author could I chuse to follow rather than him, who selected the best things out of the writings of the Greek physicians and surgeons, and rendered the whole into most pure and elegant Latin?

To conclude, the reader is desired to take notice, that by the compositions of medicines, which I make use of in this treatise, I mean those of the late edition of the London Dispensatory^f, unless otherwise signified.

^e Lib. viii. cap. 4. ^f Pharmacopœia Collegii Regalis medicorum Londinensis. Lond. 1746. 4°. And the translator of this work has taken the English names of the above-mentioned compositions from Dr. Pemberton's translation of the said Pharmacopœia. Lond. 1746. 8°.

M E D I C A L
P R E C E P T S
A N D
C A U T I O N S.

I N T R O D U C T I O N.

Of the human body.

BEFORE I begin to treat of the diseases of the human body, it may not be improper to give the reader a succinct idea of its nature in a state of health.

Wherefore, in order to form a just notion of the body of man, it ought to be considered as a hydraulick machine contrived with the most exquisite art, in which there are numberless tubes properly adjusted and disposed for the conveyance of fluids of different kinds. Of these the principal is the blood, from which are derived the several humours subservient to the various uses and purposes of life; and in particular that subtle and remarkably elastick fluid, generated in the brain, and known by the name of animal spirits, the instrument of sense and motion: which

which functions it never could be capable of executing, were it not contained in proper organs. For this purpose the almighty Creator has formed two sorts of fibres, the fleshy and the nervous, as receptacles for this active principle; and each sort of these is partly interwoven in the membranes of the body, and partly collected into bundles or cords, and attached to the limbs, for performing their motions with the assistance of the bones.

But this wonderful machine, incapable of putting itself into motion, was still in want of a first mover: wherefore the mind is placed over it, as a ruler and moderator, and is the efficient cause of all sense and motion. For whether this principle resides in the head, as in its citadel; or whether it has no fixed place, but is dispersed all over the body, according to the opinion of Xenocrates, a disciple of Plato^a; it commands within us, and directs the whole. Now, our motions, as well as our senses, are twofold, internal and external: the internal have not only the vital parts, as the heart, lungs, stomach and intestines, subject to them, but likewise all the nervous membranes.

Medical writers generally make a wide difference between the motions of the vitals, and those of the rest of the parts; imagining that the former, after they are once begun in the first formation of the individual, necessarily continue even against our will; but that the latter are performed at the discretion of the mind, as circumstances require. But this is a false notion, into which they are deceived by observing, that these natural actions continue without any sensible intermission, even when we are little or not at all conscious of them, through the whole course of life: whereas, if the thing be narrowly looked into, it will manifestly appear, that the reason why these vital motions seem not to be governed by the mind, is, because being incessantly accustomed to them, we perform them so quick, and without attention, that we cannot easily check and hinder them from performing their respective offices. Something of this kind we
expe-

^a See Lactantius de opificio Dei, cap. 16.

experience, when, looking at the sun, or any body that strikes the eye too forcibly, we wink whether we will or not : and yet nobody doubts, but that those motions are effected by the direction of the mind. I could bring several other examples to confirm and illustrate this sentiment ; but to avoid being tedious, I choose to refer the reader to a dissertation of Dr. Porterfield, who has handled this subject with great perspicuity ^b, as I have said in another place ^c.

But this power of the mind is most remarkably perceptible in those fevers, which are called pestilential. For in these one may observe, that the mind hurries to the assistance of the labouring frame, fights against the enemy, and, with the aid of the animal spirits, excites new motions in the body, (though we may be insensible of it) in order to expel the poison, which is blended with the humours, through every outlet. And hence very great physicians have defined a disease to be a struggle of nature in defence of the health of the individual.

In this manner it is, that care is taken of the whole machine, when in danger. But it is likewise necessary sometimes to have a regard to some particular part ; nor does the mind fail of executing its office in this case. Thus if a topical disorder has happened any where ; to prevent the part from being overloaded and pained, nature has provided a passage for the blood and humours by the adjacent vessels. This is effected by that admirable disposition of the body, whereby the blood-vessels are interwoven and spread throughout every part ; so that the blood may pass, not only from vein to vein, but also from the small arteries into others. And this mechanism is peculiarly apparent, where obstructions are most to be feared ; as in the head, abdomen, and the long winding ducts of the organs of generation.

Now such a construction of our frame is the more necessary, because, even when a disease is not in the case, the very actions

N n n and

^b See Medical Essays, published at Edinburgh, Vol. III. Essay 12. and Vol. IV. Essay 14. ^c Disc. on the Small-Pox, pag. 314.

and customs of the body sometimes require the humours to be conveyed with greater freedom through some passages than through others. Hence the same blood-vessels become wider or narrower in different persons, according as their manner of living hath occasioned these vessels to be more or less dilated by the perpetual motion of the fluids. Thus in persons addicted to drinking, the arteries in the head, in people given to venery, those in the genitals are bigger than in the sober and continent.

And this additional remark may not be improper here, that it is almost impossible, but that the very make of the animal parts, though extremely convenient for the purposes of life, must be attended with some inconveniencies in particular cases; as in the fabrick of the universe, thunder, storms, inundations, plagues, and other such calamities necessarily happen sometimes in some places. But as the divine Creator of the microcosm has given us natural means of guarding against these evils; so he has afforded proper assistance against those which affect our microcosm.

Geometricians have been long intent on contriving a machine, that may be endued with perpetual motion; but have constantly lost their labour. For in handy-works of this kind some portion of the moving power is lost every instant, by reason of the friction of the parts, whereby it requires to be perpetually renewed. Wherefore it is God alone who can compleat such a machine; and was pleased that our body should be a fabrick of that sort, by disposing all its powers in such a manner, that they should form a kind of circle, in which, at the same time that they perform their respective functions, they should constantly and mutually repair each other.

Hence it manifestly appears, that the animal machine is made, not by parts, but all together; seeing it is impossible, that a circle of motions, some of which depend on others, be compleated, without all their instruments being in their proper places. For example, how can the heart contract, to push the blood forward, without the assistance of the animal spirits; or
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the spirits be secreted without the brain? And so of all the other principal parts. Wherefore the animalcula, which by the help of microscopes we discover swimming in the semen masculinum, are really little men; which being received into the womb, are there cherished as in a nest, and grow in due time to a proper size for exclusion. Therefore Hippocrates said very justly: In the body there is no beginning, but all the parts are equally the beginning and end^d.

To what has been hitherto said let me add, that every animal machine is of such a nature, that there is a sort of infinity in its constituent parts; by which expression I mean that their fibres are so extremely small, that we cannot discover the ultimate stamina, even by the assistance of the best microscopes. Had it been otherwise, aliment would not be conveyed to every individual part of the body, nor could the necessary functions of life be performed.

Wherefore, upon the whole, health consists in regular motions of the fluids, together with a proper state of the solids; and diseases are their aberrations: which as they are numberless, and one often produces another, it is next to a miracle, that the animal body should be able to hold out to extreme old age. And hence indeed plainly appears the extensiveness of the art of medicine, and how much superior it is to all other arts.

Now this machine, the only one that is endued with perpetual motion, was formed by the almighty Geometrician to last a longer or shorter space of time, according to the different genius's of living creatures. For a body, such as ours, cannot possibly retain life for ever; which is not difficult to account for. Because the membranous fibres of the blood-vessels, which were made elastick, in order to drive their included juices forward, become gradually harder, and at length rigid; whence they are rendered incapable of executing their offices, and the secretions

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of

^d Εμοὶ δοκεῖ ἀρχὴ μὲν οὐκ ἔδεσθαι εἶναι τῷ σώματι, ἀλλὰ πάντα ὁμοίως ἀρχὴ καὶ πάντα τελευτή. De Locis in homine, initio.

of the several parts are diminished by degrees. And that the useless juices are not sufficiently carried off by perspiration in old age (a business very material to the continuance of life) manifestly appears from dissections of the bodies of very old people; the insides of their arteries being sometimes found ossified here and there, whereby they had almost entirely lost their springiness; and the orifices of the natural ducts are often observed to be quite cartilaginous.

In confirmation of this truth I shall give two remarkable examples; the first of which is taken from our own history. Thomas Parr, a poor labouring man, was born in a healthful part of Shropshire, where he vigorously continued his daily labour to the age of an hundred and thirty years: but afterwards having lost his sight, he was at length brought to London; and having resided here for some time, in the year 1635 he died, at the age of one hundred and fifty-two years and nine months. His body was opened by the immortal Harvey, who found all the parts in a sound state, except the brain, which was extremely firm and solid to the touch*. Thus were the vessels in that part grown hard by age.

The other example is recorded in our Philosophical Transactions. It is an account of a worker in the mines in Switzerland, who died in 1723, aged one hundred and nine years and three months, sent to the royal society by Dr. John James Scheuchzer of Zurich; who upon dissection found the exterior membrane of the spleen beset with white spots, at first sight resembling variolous pustules; but they were of a cartilaginous hardness, and raised somewhat above the surface of the rest of the membrane: the articulations of the ribs with the sternum were quite ossified; the tendon, by which the arteries are inserted into the heart, was either boney, or cartilaginous at least; the semilunar valves, especially of the aorta, were plainly cartilaginous; and the

* See the dissection of Thomas Parr, at the end of Dr. Betts's book *De ortu & natura sanguinis*.

the dura mater was about three times its usual thickness, and like leather ^f.

But it is time to pass to the defects of this machine, which disturb and destroy its motions.

CHAP. I. Of FEVERS.

SECTION I. OF FEVERS IN GENERAL.

ALL Fevers, of what kind soever, are attended with a preternatural heat of the blood and humours; and this impairs the bodily strength, and the vital actions. Wherefore nature raises all her powers, and engages the disease, as a mortal enemy: and if she gets the better, she drives out the cause of the disorder by such outlets as she is able. This action is by physicians called the crisis of the disease. Now, what I would have here understood by the word nature, as also some things relating to the different sorts of Fevers, I have explained in another place ^g, and at the same time shewn, in what sense physicians, and particularly Sydenham said, that a disease is nothing else but a struggle of nature, endeavouring by all means to exterminate the morbid matter, for the recovery of the patient ^h. Wherefore I will premise some few thoughts on the crises or solutions of Fevers.

^f Phil. Trans. N^o 376.

^g See Discourse on the Small-Pox, chap. 2.

^h Observat. medicæ circa morborum acutorum historiam, at the beginning.

SECTION II.

OF THE CRISES OF FEVERS.

Whereas there is no Fever cured without some considerable evacuation, raised either by nature or by art ; the physician ought carefully to observe, which way nature seems to intend the expulsion of the morbid matter, and assist her by all possible means. Now this expulsion is very frequently made through several outlets of the body at a time, and an evacuation by one outlet more or less checks that by another: thus a looseness checks sweat, and vice versâ. Wherefore it is the physician's business to discern, what evacuation is most likely to be of service, and so to promote this, as to give the least interruption possible to any other : for any one evacuation is not equally suitable to all persons, both on account of the difference of constitutions, and of diseases ; although evacuations through every emunctory are sometimes necessary, as we find by experience in malignant Fevers.

But of all solutions of the disease the most desirable is by sweat, next to that by stool and urine ; the worst is by a hæmorrhage, whether it proceed from the nose, or from any other part : because it indicates, that the blood is so far vitiated, that no proper separation of the humour can be made.

Lastly, some Fevers terminate in abscesses formed in the glands, which, if they happen in the decline of the disease, and suppurate kindly, are salutary. Wherefore the suppuration is to be forwarded by cataplasms or plasters, and sometimes by cupping on the tumour ; and then, if the abscess does not break spontaneously, it ought to be opened either with the knife or a caustick.

At this time this rule of practice is generally right, not to exhaust the patient's strength by evacuations of any kind. And yet in some cases there is a necessity for drawing a little blood ;

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as when the humours are in great commotion, and the heat excessive: for this remedy prudently administered makes the tumour ripen kindly, because nature has always a great abhorrence of a turbulent state.

SECTION III.

OF CONTINUAL FEVERS.

There is no disease, to which the useful precept, *principiis obsta*, is more applicable than to Fevers: because in the beginning it is generally easy to do good; but when the distemper has gained ground, the cure is often attended with difficulty. For the opportunity is fleetingⁱ; and a medicine, which early administered might have prevented the impending danger, frequently fails, when the bodily strength is exhausted by the violence of the disease. However, a patient, who applies late for assistance, is not to be abandoned to his fate; since it is certain, that those diseases, which in old times were ascribed to the divine wrath^k, are frequently cured by natural means, even when they appear most desperate. Wherefore the physician ought to lay it down as an absolute rule, never to be wanting to his duty.

And first, as blood-letting is a most excellent remedy in the beginning of all Fevers; if it has happened to be neglected for some days, let us consider, whether it is still proper to be ordered.

In case of intolerable pain in any part of the body, of difficulty of breathing, or a delirium, blood is to be taken away, according to the patient's strength; with the lancet, if he is able to bear it; if too weak, by cupping; but if excessively so, by leeches. And if this may be done, when the disease is got to the height; it ought for stronger reasons to take place in the beginning. And let me observe by the bye, that leeches are often of vast service in a delirium. I have also sometimes found by experience, that pieces of lamb's lungs, applied warm to the head,

ⁱ Ὁ καιρὸς ὀψύς. Hippocr. Aphor. I. Sect. I.

See Celsus in his Preface.

head, have carried off the phrenzy, by the exudation of the noxious or superfluous humour.

But in order to a clearer comprehension of what I have to offer on this distemper, I will enumerate and briefly explain its principal kinds; leaving the reader at liberty to consult the medical writers, especially Celsus and his imitator Lommius, who have treated this subject professedly, concerning the management of the sick, his diet, &c.

SECTION IV.

OF FEVERS ATTENDED WITH ERUPTIONS.

Fevers attended with eruptions require particular attention. As for the small-pox, measles, and plague, I have already published my thoughts on them in separate treatises. Of the rest the chief is

THE MILIARY FEVER.

There is no Fever, that puts on more various appearances than this. Pustules, rough to the touch, break out, sooner or later, all over the body; sometimes red, sometimes whitish, and again both sorts intermixt; at one time smaller, at another larger and more elevated, and of a bad smell. Sobbing and anxiety about the heart are very frequent symptoms, which are often followed by a delirium and convulsions. The disease runs into a considerable length: and if it happens to end too soon, without a sufficiently perfect crisis, it often brings on a bad habit of body. The red pimples are not so dangerous as the whitish; and the more lively their colour, they are the safer. Hence it appears that this Fever is more owing to a defect in the humours, and the animal spirits in particular, than to any bad quality of the air; and that it requires different methods of cure according to its different circumstances.

But of what kind soever the pustules are, blood is to be drawn in the beginning, if the patient has strength to bear it; unless he be actually in a sweat, in which case blood-letting is either to be omitted, or at least to be put off for a day or two, or some other convenient time. Now red pustules bear bleeding much better than the whitish: and though in both sorts blisters are serviceable, yet they are more necessary in the latter; and they are to be applied to the neck, head, and all the limbs, at proper distances of time. After all, I would advise the physician always to bear in mind, that the more sparingly blood has been drawn, the more happily the disease generally terminates: for when the strength has been exhausted by evacuations toward the latter end, the eruption sinks in, and the patient dies.

Nature's endeavours to expel the morbid matter through the skin, are to be assisted by moderately cordial medicines. Of this tribe the most proper are the bezoardick powder, the compound powder of contrayerva, and the cordial confection; adding nitre, in case of an inflammation: and this salt may be very advantageously joined to cordial medicines in almost all malignant Fevers, at least in the beginning. Toward the decline, warm bathing is sometimes serviceable, in order to bring forth the remains of the pustules.

But if, either at the height, or on the decline of the Fever, the only appearance of an eruption is a vast number of pellucid vesicles, so small as hardly to be seen; it is not safe to persist too long in the use of internal medicines of this tribe; unless the length of the distemper has so far weakened the patient, as to render even more powerful cordials necessary. For such little roughnesses of the skin are not able to bring on a good crisis, but on the contrary, generally denote a difficult and tedious illness: wherefore without discontinuing the blisters, the cause of the disease is to be carried off by other ways, especially through the intestinal canal by gentle purges of rhubarb, or manna and Glauber's salt.

It is to be observed, that this disease is not always terminated by any one sort of crisis. It has sometimes one sort, sometimes another : and in some cases several sorts together ; as I have already said frequently happens in other malignant Fevers. Thus at the same time that there are other discharges of the morbid matter, a thrush sometimes breaks out, and spreads all over the mouth and throat. This commonly begins with a hiccup : and if it be whitish and very moist, and occasion a plentiful spitting, it is so far from portending any great danger, that it is a sign of the distemper ending happily : but if it be of the black kind, and dry, and the spittle tough and little in quantity, it is of fatal omen, as it indicates the mouth and throat choaked up with slimy phlegm. In these cases it is proper to use gargles made of barley-water and syrup of mulberries, or some such other syrup, or the pectoral decoction : for repellents of all kinds are to be carefully avoided.

It may possibly seem strange to some, that Sydenham prescribed the bark in this Fever and the aphthæ attending it, and says, he always found it to answer his expectations¹. But this was not a rash practice in that sagacious physician : for this Fever often intermits, when the aphthæ do not appear ; but it more frequently ends upon their going off. In both cases this excellent antidote is of very great service. And in justice to the memory of that great man, who had accustomed himself, after the example of Hippocrates, to observe the return of epidemical diseases, and found that they varied in the same seasons of the year according to the diversity of the weather ; I must observe, that he was the first among us who described this Fever ; which, he says, took its rise here in the month of February 1684, after the long severe frost of the preceding winter. Hence it is probable, that it arose from the acrimony of the humours induced by the constriction of the fibres of the skin from cold, and the consequent diminution of perspiration.

SECTION

¹ See his *Schedula monitoria*.

SECTION V.

THE PETECHIAL FEVER.

The petechiæ, from which this Fever has its name, are broad, red spots, like the bites of fleas, not rising above the surface of the skin. When they are livid or black, they are of very dangerous prognostick: because they are really so many little gangrenes; and therefore the more numerous they are, the more their consequence is to be dreaded.

The common practice of giving hot medicines in the beginning of this distemper, in order to raise sweats, is quite wrong. It is much the safer way, to check the gangrenous disposition of the humours by the bezoardick powder, or rather the compound powder of contrayerva, with nitre, as is above-mentioned; or to assist nature with the cordial confection dissolved in simple alexeterial water: and also to acidulate the patient's drink with dulcified spirit of nitre; to repair his strength with Rhenish wine; and in fine, a very proper drink will be barley-water with juice of lemons. And all these liquors are to be drank plentifully. It will likewise be of use sometimes, to administer some doses of the calx of antimony and bezoardick powder mixt, in order to provoke sweat: but the calx should not be too much washed. Yet it is necessary to admonish, that it is not an uncommon case, especially towards the latter end of the disease, that the patient's weak low state requires warmer cordials; such as Virginia snake-root, contrayerva-root, the root of wild valerian, saffron, and the like. And infusions of these in water will be far more convenient than their powders; especially if they be mixt with a small quantity of distilled vinegar.

SECTION VI.

THE ERYSIPELAS.

Great attention is to be given to that Fever which is accompanied with an Erysipelas. For in this, besides the pain, thirst, and restlessness, which the patient suffers; the pustules on various parts of the body sometimes run into gangrenes.

Wherefore the first thing to be done is, to draw blood pretty plentifully; and then to purge once and again with gentle catharticks, as infusion of senna with manna. For such only are proper in Fevers. And indeed there is no acute Fever, that bears repeated purging better than this, especially when the inflammatory tumour has seized the head: for the humour spreads very fast, and soon gains the neighbouring parts.

But it is dangerous to apply hot fomentations, in order to discuss the morbid matter; and much more so, to repel it with cooling ointments or liniments. But if the skin in any part be gangrened, that part is to be fomented with a decoction of bitter herbs mixed with camphorated spirit of wine; and afterward a cataplasim of oatmeal boiled in strong beer is to be laid on warm, and to be renewed as oft as is found necessary.

And to give this caution once for all; not only in acute diseases, but in several chronical, which are attended with pustules that suppurate, it is safer and better, unless the skin is the sole seat of the ailment, to encourage the eruption by gentle means, or at least to suffer it to come forth for some time (that is, as far as the patient can bear the uneasiness) than either to repel, or purge off the humour by other outlets. For there is in every kind of vicious humour somewhat peculiar to itself: and as they generally come forth by way of crisis; how much soever they may be diminished, yet they are rarely evacuated out
of

of the body, with relief to the sick, by any other passages than those pointed out by nature.

As to internal medicines, those which I have recommended in eruptive Fevers, are the most proper in this.

I close this essay on malignant Fevers, with a few remarks on three other celebrated medicines, viz. camphire, spiritus Mindereri, and musk. And it is worth remarking that they are all powerful sudorificks.

Camphire is vastly extolled by many. And indeed, not to mention other authors, that experienced physician Riverius has given a case or two, in which it was of signal service^m. However it is worthy of observation, that it was not then exhibited alone, but joined with cooling medicines (agreeable to the caution I gave, when hot medicines are given in petechial Fevers :) for camphire is very hot. Wherefore the most convenient way of giving it is this :

Take of camphire one drachm ; grind it with a little rectified spirit of wine ; then mix it thoroughly with half an ounce of double-refined sugar : and afterward pour on it gradually one pint of hot vinegar.

For thus that medicine, which is otherwise apt to create nauseating, is rendered more agreeable to the stomach, and better adapted to the disease.

Upon the same principles Mindererus's spiritⁿ is likewise of excellent use in all putrid Fevers.

In fine, I have more than once experienced the good effects of musk, especially when convulsions come on : and thus I order it :

Take of musk, the cordial confection, and cinnabar of antimony, each ten grains ; mix, and with a little syrup make a bolus, to be repeated at proper intervals.

^m See Observat. medic. centaur. ii. obs. 18.

ⁿ Of the Edinburgh Dispensatory.

SECTION VII.
OF PARTICULAR FEVERS.

Those Fevers which are accompanied with an inflammation of any particular parts, require a treatment suitable to those parts. I instance in

A PLEURISY.

In which, after drawing as much blood as is necessary, draughts with fresh-drawn linseed-oil are of great service for easing the cough ; nitre for allaying the heat ; for dissolving the fizy blood, obstructing the small canals, wild goat's blood, and volatile salts : and lastly, a blister laid on the part affected, in order to draw forth the peccant humour. The advantage of this external remedy I first learnt from Sir Theodore Mayerne's practice^o ; and I have for many years past used it with good success. In fine, toward the decline of the disease, when the inflammation is abated, it will be proper to purge the patient gently.

But I must not omit to take notice, that a purulent abscess or empyema, from an inflammation of the exterior membrane of the lungs, and its adhesion to the pleura, is sometimes formed in this disease ; and more frequently still in a peripneumony. In this case, if the tumour points outward, a caustick should be applied to it, to let out the matter : and the ulcer is to be kept open during life. For I have seen instances, where, upon healing it up, and consequently stopping the drain, the patient died in a little time.

^o De morbis internis Syntagma primum, cap. v. De pleuritide.

SECTION VIII.

OF INTERMITTING FEVERS.

That an intermitting Fever is not carried off by the Peruvian bark with a proper degree of certainty, without premising a vomit or a purge, or both, is not unknown to physicians; but to join some mild cathartick to this remedy, will perhaps appear new in practice. For it is commonly thought among us, that this medicine has little or no effect, unless the patient be costive, while he takes it. But long experience has taught me, that it is quite necessary to add a small quantity of rhubarb to this febrifuge; so as to procure two stools at least every day. Nor have I ever observed, that this procedure has lessened its virtue, but rather rendered it more efficacious. For although strong irritating catharticks raise such disturbances in the blood and humours, as make the proper medicines ineffectual; yet moderate purging is attended with this good effect, that the stomach better digests whatever is taken in, whether medicines or food; whereby their finest and most wholesome parts pass into the mass of blood.

The occasion of my contriving this method of giving the bark was this. Near twenty years ago intermittent Fevers, of a worse sort than ordinary, were very rife, and frequently terminated in a bad habit of body, and even in a dropy; which consequences, when I had maturely considered, I thought, that this method might probably guard against them; nor was I deceived in my opinion. And the success, with which it was attended, encouraged me to pursue it, whenever this disease attacked bodies loaded with gross humours. But I was well aware of the danger of purging too much. Wherefore my custom is, after having given a drachm or two of rhubarb in this manner, to omit the purgative, and continue the use of the febrifuge alone. And besides the advantages already recited, I made this observation,

tion, that when the disease is carried off by this method, there is always less danger of a relapse.

Now, with regard to this noble medicine, I have this one admonition to give, that it is not proper in any other Fevers but those of the intermittent kind. For in continuals, it is so far from being of service, that it does much mischief; and it is pernicious also in those hecticks, which are accompanied with ulcers of any of the internal parts; though they often have periodical returns, and much resemble quotidian or tertian intermittents. Whence it may not perhaps appear an improbable conjecture, that this medicine operates on the bile alone; for that the bile has a considerable share in causing intermitting Fevers, I have not the least doubt.

However, it sometimes happens, that this febrifuge fails in true intermittents; which failure is generally owing to a bad habit of body. Wherefore the physician should use his best endeavours to discover in what part the fault lies; and it will be commonly found to be in the viscera and glands of the abdomen. Upon this account it will be necessary to prescribe some purges, and sometimes vomits; and in the intermediate days deobstruents and stomachicks, the best of which are aromatick bitters and preparations of steel. And for the same reason it is, that quartans are of more difficult cure than any other intermittents: for in these the blood and humours are inert and excessively viscid; so that there are two diseases to be conquered together, the bad habit of body, and the Fever: which is generally done effectually, by joining Virginia snake-root and steel with the bark. However, it may not be improper to take notice, that in some cases where the bark did not answer, I have taken off intermitting Fevers with a powder composed of chamomile-flowers, myrrh, salt of wormwood, and a little alum.

But there is more danger attending that sort of intermitting Fever, by the Greeks named *ἡμιτερτικός*, that is, semitertian.

This

This Fever returns every third day ; and of forty-eight hours the fit commonly takes up about thirty-six, more or less ; nor does the Fever go off entirely, but only remits between the paroxysms.—Hence Galen was right in saying, that it was compounded of a continual quotidian and an intermitting tertian ^p.

Thus a particular regard is due to this disease, which seems to be caused by an inflammation of some internal parts, accompanied with obstructions from bilious humours and too viscid lymph. Wherefore blood is to be drawn once or oftener, according to the patient's strength : and gentle purgatives, such as the diuretick salt, manna with Glauber's salt, and the like, are to be ordered and repeated at proper distances of time. Nor ought we to be hasty in giving the bark, for fear it should encrease the inflammation by adding to the obstruction of the viscera, and bring on a hec tick. It will be much safer, first, to order the saline draughts, with juice of lemons, salt of wormwood, and simple cinnamon-water, to be taken frequently.

SECTION IX.

OF EPIDEMICK FEVERS.

Epidemick Fevers are caused by some fault in our ambient air ; and that is chiefly owing to the excess of heat, cold, drought, or moisture, or to the unreasonable vicissitudes of these qualities.

In Greece and Asia, where the seasons are generally uniform, and the winds pretty regular from certain but different quarters in the different months of the year, it was easy for men of sagacity to observe the changes of the weather, with their good and bad effects. And on a long use of this method of observation was built the art of prognostick in diseases ; wherein Hippocrates the father of physick first excelled.

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But

^p De different. febr. lib. ii. cap. 7.

But in our climates, such is the inconstancy of the weather, and so many are the causes that raise different and even contrary winds on a sudden, that it seems impossible to erect any solid superstructure on that foundation. And accordingly Sydenham, who, in imitation of Hippocrates, attempted to describe the Fevers of each respective year, and to account for their differences from the difference of the weather and seasons, found at length “ that he had made no progress in discovering the causes
 “ of epidemical diseases by observing the manifest qualities of
 “ the air : as having remarked that in different years, which
 “ agreed perfectly well in the visible temperature of the air,
 “ the reigning diseases were very different, and so on the con-
 “ trary : and likewise that there are various constitutions of
 “ years, which depend not on heat, cold, drought, or moisture,
 “ but on some occult and inexplicable alteration in the very
 “ bowels of the earth.”

Now, this matter, in my opinion at least, stands thus : that the manifest qualities of the air have a considerable share in producing epidemick diseases, is a point that admits of no doubt ; but there are other conjunct causes, which alter the force of those qualities, either by encreasing or diminishing them. These chiefly spring from the earth, as Lucretius wisely said,

— *ubi putrorem humida nata est,
 Intempestivis pluviisque & solibus icta*.*

When she's grown putrid by the rains, and sweats
 Such noxious vapours, press'd by scorching heats*.

Now as this terrestrial putridity is chiefly occasioned by rotted vegetables, and sometimes also by the dead bodies of animals, and by minerals ; so the waters, especially of lakes and morasses, which

* Obs. med. cap. ii. De morbis epidemicis.
 Lucretius, B. vi. v. 1057.

* Lib. vi. v. 1099.

* Creech's

which have their plants and animals, in the same manner frequently exhale pestilential vapours, which infect the circumambient air. In this class may be ranged, though rarely happening in our climes, inundations, earthquakes, eruptions from mountains, and all other remarkable and uncommon phenomena of nature, which are capable of filling the air we breathe, with particles offensive to animal life. For these affect our bodies, and prepare them for the easy reception of diseases.

SECTION X.

OF SLOW OR HECTICK FEVERS.

Slow Fevers, commonly called hectick, are owing to so many different causes, that they may well seem, not to be the same, but different diseases. Of all this tribe the most pernicious are those, which arise from an ulcer in any principal part of the body, the lungs especially, by the purulent matter mixing with the blood, and disturbing its natural motion.

Now it is to be observed, that the persons most liable to these exulcerations of the lungs, are such as had been afflicted with scrophulous disorders in their infancy or youth. To which purpose I remember the experienced Dr. Radcliffe was wont to say, that pulmonary consumptions in this and the colder countries are generally scrophulous. And indeed, in the dissection of bodies, dead of consumptions, we very often find the lungs beset with tubercles or indurated glands, which had suppurated and thrown off purulent matter.

Medical writers have accurately described the various stages of this disease, as they succeed each other; but they have not taken sufficient notice, that some of its first causes have their periods or returns. And yet it is of great consequence to observe and prevent these periodical returns, as much as possible. Thus we see several persons at certain or stated times seized with a spitting of

blood, or a defluxion of thin ferofities on the lungs, and sometimes with bilious vomitings. In all these cases the bark is of service, if joined with pectorals, and given before the expected return of the disorder: which rule holds equally good in other hæmorrhages. But, when the lungs are actually ulcerated, this same medicine is very prejudicial; as shall be taken notice of anon.

In ulcers of the lungs physicians particularly recommend a milk course, as having the double advantage of being food and physick. But this practice is liable to some caution; because some people have a natural aversion to milk. Moreover, in head-achs, acute Fevers, and excessive thirst occasioned by them; and likewise in flatulencies, in bilious loosenesses, and very bloody stools, milk ought always to be deemed a poison¹. Now we generally give the preference to asses milk, though less nutritive; because it is more cooling and detergent. But when it cannot be conveniently had, whey, made of cows milk, or even of goats milk, may be substituted in its room, especially if the goats have been fed on fragrant herbs: but cows milk itself, although diluted, as usual, with barley-water, is very frequently inconvenient. And the whey may be rendered more suitable to the disease by infusing stomachick and carminative herbs in it. But it happens unluckily sometimes, that when milk is extremely necessary for the body, such is the laxity of the intestines, that they cannot bear it. In this case, the milk may be medicated in this manner: Take of red roses dried, of balauftins, pomegranate rind and cinnamon, each one drachm; boil them in a pint of cow's milk. When the decoction begins to boil, pour a little cold water into it, to make it subside: repeat this process several times, till you have used a pint of water, and till the milk and water together are reduced to a pint. Then strain off the liquor, sweeten it with sugar, divide it into convenient draughts, so that the patient may take the whole quantity every day. This diet will

answer the double intention, of affording nourishment, and restraining the looseness; without putting the least obstacle to the use of other food or medicines.

Now, it is of the utmost consequence to attempt the cure of this dreadful disease early; and as it arises from inflammation, it requires not only one, but several bleedings. If the blood be thick and black, or fizy, it is called bad blood, and is thought to indicate further bleeding; but if it be red and florid, it is esteemed good, and the lancet is no more used. But this notion is apt to lead into mistakes: for it is not uncommon to see blood drawn, when in the highest effervescence, extremely florid, and at the same time thick and fizy: in which case, bleeding ought to be repeated till its redness and fizyness are diminished; which may be done without danger. It will possibly be thought a rash practice to draw blood, even when the patient is much wasted in his flesh, and very weak. But it is better to try a doubtful remedy than none: and a temporary lessening of the strength is of service, when attended with a removal of part of the cause, which would weaken the body more and more every day. Wherefore, if the lungs be ulcerated, and the Fever run high, it will be proper to take away as much blood as the patient can bear, at proper intervals, so as to allow the body time to recruit. I have seen cases, judged almost desperate, where this method of practice succeeded well: but if it happen otherwise, the physician is not to be branded with the death of the patient, whose viscera were so corrupted, that it was impossible to save him.

Before I quit this article, I must observe, that fumigations with balsamicks, such as frankincense, storax, amber, and benzoin, in order to correct and sweeten the acrid and salt humours, is of vast service in some cases: which is to be done by throwing the ingredients on red coals, and receiving the fumes through a proper tube directly into the windpipe and lungs². I am very sensible,

² See Christophori Benedicti tabidorum theatrum, sub finem. Lond. 1656.

sensible, that this method of administering balsamicks is almost entirely neglected, as useless. But whosoever considers the length of the way, which they must make by the blood-vessels, before they reach the lungs, and what a small part of them comes to the place of their destination, will easily see, that this is the best way of communicating their virtue, if they have any.

For the same reason, I have known the smoke of balsam of Tolu, sucked into the lungs through a proper tube, as we smoke tobacco, to be of signal benefit, especially in spitting of blood.

To these little suppurations it may not be improper to subjoin a larger abscess, which is sometimes formed in the same part, and is named a vomica. This disease, though bad in itself, and often terminates in a consumption; yet is not attended with so much danger, as those lesser exulcerations. For I have seen cases, wherein the patients, in a fit of coughing, threw up a pint or two of purulent matter of such an excessive stench, that people could not bear the room, mixed with blood; and yet they were perfectly cured by a milk-diet and balsamicks, with anodynes properly interspersed.

Thus far of the phthisis, or pulmonary consumption.

But there are two other species of consumption, which waste a person different ways. In one, the body is not nourished; and as some particles are always naturally flying off, and nothing coming to supply their place, an excessive wasting of flesh ensues, which is called an atrophy. This is very frequently owing to a defect in the nervous fluid; and is either accompanied with a cachexy, which is the other species, or gradually brings it on. In both species, the food is corrupted by reason of the bad habit of body, and the parts are not recruited: and therefore a well regulated course of living, and steel-medicines to strengthen the stomach, with laxatives at proper distances, are particularly indicated.

Lastly, in all decays exercise and frictions, according to the patient's strength, ought to be constantly used: change of air is generally

generally of service, and sometimes a long sea-voyage. Patients labouring under disorders of the lungs, in this country, are very justly sent to Lisbon or Naples. But riding on horseback, if practicable ; if not, in a coach, or a litter at least ; or some other manner of moving the body, is always proper.

C H A P. II.

Of the diseases of the head.

SECTION I.

THE APOPLEXY.

MOST diseases of the head have a great affinity with each other, and commonly proceed from repletion. Of these the principal is the Apoplexy, which is sometimes owing to an over viscid blood, circulating too slowly, and almost stagnating in the arteries of the head : and this viscid blood, being perpetually urged forward by the force of the heart, bursts its vessels ; and lodging on the brain, and compressing the nerves subservient to the motions of the body, obstructs their ducts, and prevents the influx of their native juice. But it is more frequently caused, without any considerable rupture of the vessels, by a watery and red humour transuding from the blood, or by the juice, ouzing out of the circumjacent glands, which loads the membranes of the brain, fills its ventricles, and stops the course of the animal spirits. The former of these may be called the sanguineous Apoplexy, the latter the pituitose. To that Hippocrates gives the epithet of strong, and pronounces it incurable ; and to this, he gives that of light or weak, and yet says it is difficult to be cured^a. A great number of histories of both sorts may

^a Aphor. Sect. ii. 42.

may be read in Wepfer ^b: and Bellini has most rationally accounted for all the symptoms, in this, and the like distempers ^c.

I shall not dwell on external causes, such as blows, falls, and fractures of the skull occasioned by them; because they indicate no peculiar treatment, but what depends on surgery.

The sanguineous kind requires plentiful and frequent bleeding, both from the arm and jugular veins; but purging is more requisite in the pituitose. Opening the occipital veins, proposed by Morgagni ^d, is likewise of considerable benefit, as I have experienced in several very dangerous cases. For as these veins have a communication within the brain with both the lateral sinuses; by opening these veins, part of the blood, which they would have conveyed into the sinuses, is taken off; and the quantity of blood in the sinuses being thus somewhat diminished, its motion through them is more easily performed. And therefore cupping in the nape and sides of the neck, with pretty deep scarifications, to give a free passage to the blood, is always useful.

Upon the same account also it is, that drawing blood from the temporal arteries, which some authors recommend, is of service, if it can be of any. As to the safety of this operation, Galen indeed asserts, that he saw an artery, even in the arm, opened without any great inconvenience ^e. But yet the quantity of blood, taken away by opening the temporal artery, is so inconsiderable, that much benefit cannot be expected from that practice. Wherefore it would be better to follow the advice, which Aretæus gives in an inveterate head-ach, of opening the two arteries behind the ears ^f; because they will discharge more blood, that would have run into the head, than the temporal arteries can.

Blisters are likewise to be laid on the head and all the limbs; and catharticks are necessary, taken both by the mouth, and by
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^b Observ. anatom. ex cadaveribus eorum, quos sustulit apoplexia, Amstel. 1731.

^c De morbis capitis.

^d Adversar. anat. vi. animadv. 83.

^e Method.

medendi, Lib. v. cap. 7.

^f De morb. diuturn. curat. Lib. i. cap. 2.

way of clyster : but they must be acrid and powerfully stimulating ; because the nervous fibres are become very torpid.

The lethargy and carus are lighter species of the Apoplexy.

S E C T I O N II.

THE P A L S Y.

The apoplexy, when it is not mortal, very frequently terminates in a Palsy, which is the crisis of the disease : and this Palsy generally seizes but one side of the body. And what the above-cited Morgagni observes after Valsalva, that on dissection of the bodies of apoplecticks, who had been seized with a hemiplegia, he always found the cause of the disease in the opposite side of the brain ^a, I have formerly found true, more than once, in St. Thomas's hospital.

There is now no longer any room for blood-letting, or drastic purges ; it will be sufficient to give warm and moderate catharticks now and then, such as the tinctura sacra. And as the disease is now become chronical, instead of blisters, it will be requisite to make issues in proper places, especially in the nape of the neck, and above the scapulæ, either with the actual cautery, or with caustick medicines. Hippocrates advises to apply the actual cautery in eight places at least, and specifies them ^b.

The cure is to be chiefly prosecuted with aromattick strengtheners and steel. And besides, it is of service to stimulate the skin of the paralytick part : which is extremely well effected by the green ointment, mixed with a seventh or eighth part of the strong spirit of vitriol : and when the part begins to be rubefied, this liniment is to be removed, and the part anointed with ointment of elder. Cold-bathing is very beneficial in persons not too far advanced in years ; but hot-bathing is prejudicial to all para-

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lyticks.

^a Adversar. anat. vi. animadv. 84.

^b De Morbis, Lib. ii. Sect. 12.

lyticks. And I have known some cases of paralyticks, sent to Bath by a mistaken notion of their physicians, who, upon coming out of the bath, were seized with a return of the apoplexy, which carried them off.

Wherefore I take this occasion to publish some remarks, which I have made on these waters. Their chief virtue seems to me to consist in a certain mineral heat, whereby they warm and cherish the stomach and intestines; and therefore they are chiefly serviceable to those, who have ruined their appetite and digestive faculty by drinking wine, or other spirituous liquors: which is well known to be the cause of a number of evils. But they are very prejudicial to all, whose inward parts, as the brain, lungs, liver or kidneys, are too hot. And for the same reason, though they may be agreeable to, and mend the stomach; yet if the use of them be continued too long, they more frequently hurt this organ; that very warmth, which was beneficial at first, by immoderate perseverance becoming prejudicial, by over-relaxing the fibres. A circumstance, which I have several times observed more particularly in patients, whose diseases were owing to a fault in the nervous fluid.

This disease never is acute, is often tedious, and in old people almost incurable; and the patient for the most part drags a miserable life. For the vigour of his mind together with his memory are lost, or vastly impaired; he totters and shakes, and is become a dismal sight; as if no longer a man, but an animal half dead.

ST. VITUS'S DANCE.

This odd disease, both in symptoms and name, is of the paralytick kind, and is cured by frequent cold-bathing and chalybeate medicines, as I have already said upon another occasion¹.

¹ Influence of the Sun and Moon, p. 197.

SECTION III.

THE EPILEPSY AND VERTIGO.

Concerning the periodical returns and method of cure of both these diseases, I refer the reader to what was said before^k, in which I treated of them pretty amply.

However, to what has been there said, I think proper to add two admonitions. The first is, that the vertigo is very often more a disease of the stomach, than of the head; or at least, that both these parts are affected together, from a quantity of bilious and viscid humours lodging in the guts. When that is the case, no medicines will be effectual, without premising a vomit of Ipecacoanha wine, or some other proper emetick. And afterward, Mynsicht's elixir of vitriol, taken in spring-water an hour or two before and after dinner, will mend the appetite and digestion.

The other is, that the Peruvian bark, joined to some medicine appropriated to the disease, has frequently been of great service, especially if it be given thus:

Take of Peruvian bark one ounce; of wild valerian root powdered two drachms; of syrup of orange-peel a sufficient quantity; make an electuary.

Of this let the patient take a drachm, after the proper evacuations, morning and evening for three months together; and then repeat it three or four days before the new and full moon.

THE TETANUS.

This uncommon disease is a violent preternatural convulsion of the muscles of the whole body: and therefore is to be treated with the same medicines as the epilepsy.

^k Influence of the Sun and Moon, p. 177, &c. 195, &c.

C H A P. III.

Of MADNESS.

THERE is no disease more to be dreaded than Madness. For what greater unhappiness can befall a man, than to be deprived of his reason and understanding; to attack his fellow-creatures with fury like a wild beast; to be tied down, and even beat, to prevent his doing mischief to himself or others: or, on the contrary, to be sad and dejected, to be daily terrified with vain imaginations; to fancy hobgoblins haunting him; and after a life spent in continual anxiety, to be persuaded that his death will be the commencement of eternal punishment? And to all these may be added this unhappy circumstance, that the disorder is very difficult to be cured. Now, in order to the clearer comprehension of what I have to say from experience on this disease, I will premise a few hints concerning its nature.

A very frequent cause of this evil is an excessive intention of the mind, and the thoughts long fixed on any one object, even though it be of the pleasing kind. For such intention of mind, such fixed thought, is capable of perverting the rational faculties, as we sometimes observe in studious persons; but when it is blended with some of the passions, as hope, fear, anger, &c. the disorder is heightened; and the Madness is accompanied either with melancholy or fury, according to the nature of the cause, and chiefly according to the natural propensity of mind in the patient to this or that passion. Now, nothing disorders the mind so much as love and religion, I mean false and vain religion, or superstition. Love is attended with hope, fear, jealousy, and sometimes with wrath, and hatred arising from the latter. Superstition fills and distracts the mind with vain terrors, and notions of divine vengeance. Hence it happens, that the
Madness

Madness of persons in love is more generally of the maniacal, and that of superstitious people of the melancholick kind.

But these two disorders sometimes take each other's place, and undergo various degrees of combination.

In fine, Madness rises to the greatest heighth, when the mind is racked with contrary passions at the same time; as wrath and fear, joy and grief: which, by drawing it different ways, at length quite overpower it.

We all know the constitution of our fabrick to be such, that whatever images present themselves to the mind, whether of things that may be beneficial or prejudicial to us, they necessarily excite certain affections or passions in the soul, which are instantly followed by suitable motions in the body. Thus joy, grief, hope, fear, desire, anger, even against our will, act upon, and cause alterations in the body, by raising commotions in the blood and humours. And it matters not, whether the ideas be true and real, or false and imaginary, provided the mind has been long intent upon them: nay we often find by experience, that the soul is more powerfully wrought on by imaginary than real evils. Thus the vain dread of impending poverty is so much more intolerable than the real affliction itself, as to drive timorous people to lay violent hands on themselves. So far is the life of man exposed to miseries on every side!

Now the instrument of all these motions, both of the mind and body, is that extremely subtle fluid of the nerves, commonly called animal spirits. Concerning the nature of which we have formerly^a offered our conjectures, and have shewn, that this active fluid is very susceptible of various alterations; a remarkable instance whereof we have in the very disease, of which we are now treating.

Medical writers distinguish two kinds of Madness, and describe them both as a constant disorder of the mind without any considerable fever; but with this difference, that the one is attended

^a See Introduction to the essays on Poisons, edit. 3.

tended with audaciousness and fury, the other with sadness and fear: and that they call mania, this melancholy. But these generally differ in degree only. For melancholy very frequently changes, sooner or later, into maniacal Madness; and, when the fury is abated, the sadness generally returns heavier than before: hence all maniacal people are fearful and cowardly; which is an observation of great use in practice. Now, that the animal spirits acquire various preternatural properties, as I have already said, in all Madness, is easily demonstrated. But a surprizing circumstance in this distemper is, that it not only often preserves the patient from other diseases; but when it seizes him actually labouring under them, it lays such strong claim to the whole man, that it sometimes dispossesses the body of them. And this happens, not only in slight ailments, but also in great and dangerous illnesses; so that we may say with the poet,

Aliquisque malo fuit usus in illo.

Some benefit resulted from that evil.

I remember to have seen two remarkable instances of the truth of this observation. One was the case of a young lady, about twenty years of age, of a lively chearful temper, but weakly constitution; who from a bad habit of body fell into a dropsy of the abdomen, with great wasting of flesh. After trying all methods of cure to no purpose, when she was past all hopes of recovery, she was on a sudden seized with Madness (from what cause I know not) attended with great anxiety and vain terrors of mind: for she imagined that she was to be apprehended, tried, condemned, and executed for high treason. In the mean time she gathered strength, and the swelling of her belly subsided visibly: so that in a short time, I judged her able to bear more powerful medicines adapted to her two diseases. Accordingly she was put into a course of emeticks, catharticks, diureticks, and stomachicks; which had so good an effect, that

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in some months she recovered perfect health of mind and body.

The other, somewhat different from the foregoing, was also the case of a beautiful young lady, who was, in the twenty-eighth year of her age, seized with a violent cough, and spitting of blood. For which she was blooded plentifully in the arm, every other day, five or six times. This diminished the violence of the symptoms, but did not entirely remove them: and in two months a hectic came on, attended with thirst, heat, and night-sweats; together with great wasting of flesh, and frequent spitting of tough slime, from the lungs and throat, interspersed here and there with small portions of yellow purulent matter. Now she was running into a true pulmonary consumption, and death seemed to be at the door. Whereupon the patient began to be anxious for the salvation of her soul. She was immediately visited by her spiritual guides: who, instead of quieting her conscience, and raising her hopes, strongly inculcated, that the way to heaven was rugged and difficult, and not to be passed without fasting, prayer, and anguish of mind: as if the happiness of the life to come was not to be purchased but by the unhappiness and miseries of this life. But observe the event. The miserable young lady, overpowered by sacred terrors, was soon seized with religious Madness. Night and day she saw the appearance of devils, sulphureous flames, and other horrid images of everlasting tortures of the damned. But from this time the symptoms of the original disease began to abate: the febrile heat decreased, the spitting stopped, the sweats grew less; and her whole habit was so much changed for the better, that the bodily strength seemed to become more adequate to performing the functions of life, in proportion as the mind grew less capable of governing the body. But in a few days she grew quite melancholick. Wherefore the disease was treated by evacuations, proportioned to her strength, and other proper medicines; which seemingly had so good an effect, that there appeared some hopes of a perfect cure.

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But alas ! toward the end of the third month, the heftick and ulceration of the lungs returning, this charming virgin died consumptive, who seemed worthy of a better fate.

This disease then entirely consists in the strength of imagination. For pleasing or terrifying images are represented to the mind ; and these, in the ordinary course of nature, are necessarily followed by suitable, and as it were coherent motions of the body. Hence even brutes sometimes run mad, that is, are deprived of their reason : for (whatever some hair-brained philosophers say to the contrary) they have a share of reason proportionate to their respective natures.

Daily experience convinces us of the vast power of this faculty. For what is more wonderful, than that a man should persuade himself that he is changed into a dog, or a wolf ; that he is actually dead, and conversing with the dead, while he is full of life and strength ; that he wears a head of glass or clay ; and a hundred other such extravagant fancies, of which mad folks are sometimes possessed. And yet what often happens to pregnant women, seems still more astonishing, nay almost incredible. For it is well known, that when they are seized with violent longings, it is not uncommon to see the child marked with the fruits, or other things, for which they longed ; and these marks sometimes last as long as life. However surprising these things may be, they yet fall short of the following fact related by Mallebranche, which comes nearly up to a prodigy ^b. “ About seven or eight years ago (says he) there was in the hospital of incurables (at Paris) a young man, an idiot from his birth, whose body was broken in the same places in which criminals are broken. He lived near twenty years in that condition : many persons saw him, and the late queen-mother making a visit to that hospital, had the curiosity not only to see, but even to touch the arms and legs of this youth, in the places where they were broken.” The cause of this unhappy accident

dent was soon found to be, that the mother, while big with this child, was present at the execution of a malefactor, who was broke alive on a cross with an iron bar. That she was excessively terrified, it is easy to believe; but how the force of her imagination could produce such an effect on the fœtus, is a matter of great difficulty. Mallebranche attempts to account for it, in his usual manner, by ingenious conjectures, saying, that the imaginary faculty is a certain inward sensation, which is entirely performed by the assistance of the animal spirits: that the fœtus ought to be deemed a part of the mother's body, so that, whatever any part of the mother suffers, is by some occult communication transmitted to the same part in the fœtus. Wherefore, when the pregnant woman was shocked at that dreadful sight, possibly she suffered pain, and even some degree of laceration of the fibres, in the same limbs, which she saw broken in the malefactor: but as her bones were firm and solid, they were capable of resisting the shock; whereas those of the fœtus, being scarcely knit, were easily broken, so as never to unite again. But whether this reasoning be just, or not, the fact is a manifest proof, that the imagination has a wonderful degree of power to affect the body.

Another remarkable circumstance is, that immoderate joy, too long continued, as effectually disorders the mind as anxiety and grief. And the reason seems to be, that the pleasing images, which are constantly present to the mind, suffer it not to attend to other things: and as it is struck and interrupted a thousand ways by objects, which necessarily occur every day; hence conflicts arise, which give a wrong turn to, and at length destroy, the thinking faculty. To which may be added the notions of solicitude and fear, lest some unforeseen stroke of adverse fortune should overturn this happy state. I have formerly heard Dr. Hale, physician to Bethlehem-hospital, and of great experience in these matters, say more than once, that in the year 1720, ever memorable for the iniquitous South-sea scheme, he had more

patients committed to his care, whose heads were turned by the immense riches which fortune had suddenly thrown in their way, than of those, who had been completely ruined by that abominable bubble. Such is the force of insatiable avarice in destroying the rational faculties !

But it is still more to be wondered at, that mad-folks, especially of the melancholick tribe, sometimes take it strongly into their heads, to do things which give the greatest pain and uneasiness to the body ; than which nothing is more contrary to human nature. For, though perishing with hunger, they obstinately refuse, and even abhor food, as if it were poison ; and retain their urine for whole days together, though ready to burst. In cases of this kind, the mind seems in some measure to be called away from the senses, while it is impossible but that the pain must be felt : but the unhappy person obstinately refuses to give attention to what is transacted within his body. And it is not improbable, that he is possessed with some vain notions, which make him patiently bear the pain he suffers : for example, that, if he does not, he will have more severe tortures inflicted on him ; that the present pain was sent down from heaven on him in punishment for his sins, or is the effect of the devil's inevitable power, or of witchcraft, and many other such empty notions. For there is nothing, how incredibly silly soever, and contrary to good sense, but may affect a depraved imagination.

But, to come at length to the cure, the physician's first care ought to be to consider, what evacuations the patient is able to bear ; because evacuations of almost all kinds are generally necessary, if his strength will allow them : if not, he is to be strengthened by proper diet and medicines, till such time as he can safely bear evacuants. For, when the humours have been too much drained, it is not uncommon to see maniacal Madness succeeded by an incurable dejection of mind and melancholy ; under which the miserable patient drags a tedious life in perpetual anxieties and sadness : and mad-men for the most part live
very

very long. Now the proper evacuations in this disease are chiefly blood-letting, vomits, and purging by stool and urine: wherefore I shall offer a few remarks on each of these heads.

Blood is most commodiously drawn either from the arm or the jugulars; and sometimes also by cupping with scarifications in the occiput; particularly in case of a head-ach, or of such a degree of weakness as forbids the farther use of the lancet.

Vomiting is best excited with Ipecacoanha wine in the more weakly; but in the more robust with the tincture of white hellebore, or antimonial wine.

The properest catharticks are black hellebore, or infusion of senna with tincture of jalap; or aloes in fine, if the suppression of the monthly evacuations in women, or of the hemorrhoids in men, requires discharges in blood by these natural ways. And these evacuations, both by vomit and stool, are to be often repeated, in alternate order. Nor does it seem improper to add, that this disease demands powerful medicines; because in it the nerves are not easily stimulated.

But evacuation by the urinary organs is of greater moment than is commonly thought, especially when Madness is accompanied with a fever. For it is of little benefit to melancholics, who for the most part make too much urine. And the most apposite diureticks in this case are the lixivial salts of vegetables and the diuretick salt so called: any of which, or both sorts, may be given by turns, in pretty large doses.

Blistering plaisters applied to the head will possibly be thought to deserve a place among the remedies of this disease; but I have often found them to do more harm than good by their over-great irritation. It will be better, in imitation of the ancients, to shave the head; and then to rub it often with vinegar, in which rose-flowers or ground-ivy leaves have been infused: and also to make a drain, by passing a seton in the nape of the neck; which is to be rubbed with a proper digestive ointment, and moved a little every day, in order to give a free issue to the pu-

ulent matter. However, when the disease is of long standing, blisters are sometimes serviceable.

While the noxious humours are expelled by these means, the disease is likewise to be attacked by those medicines, which effect a change in the body. The diet ought to be slender, chiefly gruel made of oatmeal or barley, and meats of easy digestion. For the body must be nourished, that the patient may have strength enough to bear the necessary evacuations.

Authors, both ancient and modern, recommend a great number of medicines; some of which are suitable to maniacal, others to melancholick patients: but both sorts agree in the property of correcting the bile; which is acrid at first, then becomes viscid, and black as pitch. Moreover, the very blood in this disorder is thick, fizy, and black: whence upon dissection the brain appears dry, and almost friable, and the vessels distended with black, sluggish blood. Now it will be of use to observe, that most of the medicines, proper to be given in this disease, are in some degree endued with the property of opening and scouring the glands, and encreasing perspiration. Of this kind are the strong-smelling gums, especially asa foetida, myrrh, Russian castor, and camphire: which last is asserted by some authors of experience, to have likewise an anodyne quality, and to procure sleep with greater certainty and safety even than opium. And in melancholick cases, chalybeates are also very proper. In fine, a frequent use of the cold-bath is very serviceable, especially in maniacal cases. For nothing, as Celsus says, is of such benefit to the head, as cold water^c.

It now remains to lay down some rules for the management of mad-folks, than which nothing conduces more to their cure: and different methods are to be employed with the maniacal and melancholick. The unruliness of those is to be curbed; and the despondency of these to be dissipated by giving them hopes, and raising their spirits. And yet with regard to those
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^c Lib. i. cap. 6.

who are outrageous, it is not necessary to employ stripes, or other rough treatment, to bring them into order ; binding alone being sufficient for that purpose : because, as I have already said, they are all cowards ; and when they are once sensible of being thoroughly conquered, they easily submit for the future, and dare not offer violence to themselves or others.

It is a more difficult matter to manage those, whose Madness is accompanied with excessive sadness or joy ; to whose different humours the physician ought to accommodate himself. Wherefore the ill-timed fits of laughter of some are to be stopped by chiding and threatening ; and the gloomy thoughts of others are to be dissipated : to which concerts of musick, and such diversions, as they formerly took delight in, are very conducive. And how musick affects and relieves both the body and the mind, I have formerly published my thoughts ^d.

But it ought to be a standing rule, to inculcate notions directly contrary to those, with which they were long possessed ; in order to inure the mind by degrees to a new way of thinking. For as in the case of a body, broken with sickness or fatigues, rest and intermission of labour are proper to be ordered ; so it is requisite, by all practicable means, to draw off the mind from those vain fancies, which it has imbibed. And this we shall compass, if we turn it upon objects, which excite different motions in it. Thus in imaginary fears of long duration, it is sometimes beneficial to affright the patient with real dangers. But these real terrors must in their own nature be quite unlike their false or imaginary ones, in order to cause a different agitation in the mind. For the mind cannot be absolutely at rest, though it may be free from care and anxiety : and a change of ideas may be deemed a recreation and relaxation from studies : just as the muscles of the limbs, when tired with any one sort of labour, are refreshed by putting them on different actions.

Bodily

^d Mechanical account of Poisons, Essay iii. See also what Aretæus says on this head : De curat. acutor. Lib. i.

Bodily exercise is never to be neglected. Walking, riding, playing at ball, bowls, and other such sports; swimming, and travelling by land and sea, are of great use: for by these the constitution of body is strengthened, and the mind resumes its rational faculties by the constant exchange of objects.

To what has been hitherto said, I shall subjoin one animadversion more: that anodynes to procure sleep are very seldom proper in this disease. But yet in some cases, as in great terrors of mind, or when the patient, through solicitude and sadness, is much fatigued with constant watching, it may not be amiss to make trial of them; but we are not to persist long in their use: for it often happens, even when they procure sleep, that when the patient awakes, his head is filled with more terrifying ideas than before.

I close this chapter with observing, that there is no disease, in which the danger of a relapse is greater: wherefore every thing that has been hitherto proposed for the cure, whether relating to medicines, diet, or manner of living, ought to be repeated for a considerable time at due intervals, even after the patient has recovered.

C H A P. IV.

Of the QUINSY.

MEDICAL authors have carefully treated of several sorts of Quinsies; but there are three sorts the most acute and fatal of all, the nature of which they have not explained with sufficient accuracy. Of these the first may be called the watery Quinsy, the second a gangrene of the tonsils, and the third a strangulation of the fauces.

In

In the first sort, the glands of the mouth, palate, and neighbouring parts are distended and swoln. In the second, an inflammation without a perfect suppuration seizes the tonsils; which swell and grow hard; a gangrene soon ensues, which, if not very speedily relieved, is fatal. In the third, all the nerves are convulsed, and the patient drops down dead suddenly. Of this third sort I have seen one instance, in which though a large quantity of blood was drawn twice in six hours time, yet that evacuation was of no avail. Upon dissection there was not even the least appearance of swelling or inflammation in the glands or muscles of the mouth and throat; but the blood-vessels were turgid every-where with a thick blood. This disease, however rare, is described by Hippocrates. “Of Quinsies, says he, those
“are the worst, and soonest fatal, which shew nothing remark-
“able either in the fauces or neck; and yet bring on very much
“pain and difficulty of breathing^a.” These sorts are all very dangerous, and require some difference in the treatment.

I remember, that the watery Quinsy reigned some years ago like an epidemick fever in Wales, especially in places near the sea, and carried off a great number of people in two or three days from their seizure. Whereupon, being consulted by a physician residing there, I wrote him this advice; to bleed plentifully as soon as possible, and empty the first passages by a clyster, or, if practicable, by a gentle purge; and then to apply blisters under the chin, and on the sides of the neck: and if this course did not succeed, to scarify the palate pretty deeply about the uvula and sublingual veins; in order to give vent to the matter of the disease. In the mean time, to carry off the fever, I recommended a powder made up of equal parts of the compound powder of contrayerva, and very pure nitre. And this method saved very many lives.

In the gangrene of the tonsils, after bleeding and clysters, the only remedy is, to make three or four pretty deep incisions in these
glands,

^a Prognostick.

glands, which are to be dressed with honey of roses, mixed with a small quantity of Egyptian honey: and at the same time, the mouth and throat are to be gargled with a decoction of barley and figs. But it is to be observed, that all this is to be done in the beginning of the disease: for in two or three days the gangrene spreads to the gullet, and is mortal. I have seen some patients saved by this method, and others die, in whose cases it was either neglected, or applied too late: while the attending physicians were of opinion, because the fever seemed abated, that all was safe, and the patient out of danger; whereas, they ought to have considered, that his fluttering pulse, great inquietude, and cold sweats succeeding each other, were forerunners of speedy death.

This disease chiefly seizes children; and Aretæus^b has, in his usual manner given an accurate description of it; which Severinus^c has illustrated with a learned comment, calling it the pestilential Quincy of children, and commending the method of cure above described; as the Latin Hippocrates^d had done long before him.

The strangulation of the fauces, which I have called the third pernicious species of Quinsies, if it can be foreseen, ought to be prevented by evacuations of all kinds; I mean, by bleeding, purging, blistering, issues, and diureticks. And it will be of service to practise abstinence, that is, moderation in eating and drinking.

^b De causis & signis morborum acutorum, Lib. i. cap. 9. ^c Diatriba de pestilente ac præfocante pueros, abscessu, annexed to his book, De recondita abscessuum natura. Francfort, 1643. ^d Celsus, Lib. vi. cap. 10.

C H A P. V.

Of the diseases of the breast.

OF THE ASTHMA.

DIFFICULTY of breathing arises from many and very different causes. For whatsoever occasions the ambient air to enter the lungs with less freedom than usual, brings on this disease. Now, for performing respiration, first the thorax must be dilated; which is effected by the actions of the diaphragm, and intercostal and abdominal muscles. Next, the air must be received into the aspera arteria; and therefore, whensoever this duct or its ramifications are obstructed, either by a tumour, or by viscid humours, a difficulty of breathing must ensue. Then, the air itself comes in for a partial cause; for if it be much heavier or lighter than usual, it does not distend the vesicles of the lungs with sufficient force. Likewise the tenderness of the very lungs sometimes occasions this distemper. For I have known some persons, who breathed well enough in the thick air of the town; but upon going into the country, the clear air, which is beneficial to most asthmatick patients, threw them into a very great difficulty of breath. In fine, the difficult passage of the blood through the lungs may be reckoned among the impediments of respiration. Now it is manifest, that this may happen several ways; that is, through some defect in the heart, or in the blood itself. When the heart is weak, it does not sufficiently drive the blood forward; and if the blood chance to be too thick, it is not so easily moved; and in some measure stagnating in its vessels, disturbs and retards the office of the air. We could enumerate several other causes of this disease, but these

are principal ones ; and they are more or less fatal, according to their greater or lesser combinations.

As this distemper is owing to different causes, so it requires different methods of cure. However, in every species of it, blood-letting is useful, unless there be some particular contra-indication. But that alone will not suffice : vomits too, and those often repeated, are very proper, if the lungs or stomach be loaded with tough phlegm. The body must be kept open, but by no means with violent catharticks : for the most part pills, made up of equal parts of Rufus's pills and gum-ammoniack, and given every night, will answer that end. The patient is to be forbid the use of all flatulent food and drink ; and to be ordered to use exercise till he is almost tired, and frictions, of the lower parts especially, both by himself and others, till he is pretty near sweating.

In the fits, the breath is to be eased as much as possible. In the case of viscid and tough humours, this is effected by a mixture of oxymel of squills and simple cinnamon water ; or garlick either raw or preserved. But if the fault lie in the nervous juice, all the strong-smelling gums are proper, especially the milk of gum-ammoniack. But it ought to be remembered, that anodynes, which are poisons in the preceding case, are very serviceable in this, if joined with volatile salts or spirits : but of all this tribe, I know no better medicine than the paregorick elixir.

Now, as some constitutions, through some defect of the solids or fluids, are apt to relapse into this disease upon every occasion ; it is proper to give directions how to prevent it. Wherefore regard is to be had here, both to the constitution of the patient, and the nature of the disease. If he be of a hot constitution, coolers and acids, of the milder sort, are indicated ; the best of which are vinegar and the oxymels : but if it be cold, some warm medicines are serviceable ; such as the roots of elecampane.

pane and zedoary, sagapenum, myrrh, and the like. In both cases it is proper to give a vomit now and then ; and to keep the body open with gentle catharticks, as Glauber's salt. Water with a little wine is the most convenient drink.

But whereas every kind of this disease is attended with more or less of effervescence in the blood, the best way to obviate this symptom is to give the bark, especially about the usual time of the return of the paroxysm. And I have known some instances, where it has done vast service, mixed with cinnabar of antimony.

Lastly, I must not omit, that issues above the shoulder-blades are good in all asthmatick cases ; and it is very probable, that their benefit in this and some other distempers lies, not only in giving vent to the humours, but likewise in lessening the over-great tension of the nerves.

Yet all these things are to be managed with caution. From the too frequent use of blood-letting a dropsy is to be apprehended. Drinking too much water is hurtful to old folks. Violent exercise causes shortness of breath ; and so does the over-free use of acids by constringing the nervous fibres. So necessary is moderation even in medicine !

But for this, and other diseases in the breast, I refer the reader to Bellini, *De morbis capitis, pectoris, &c.*

C H A P. VI.

Of the diseases of the heart.

As the heart, the primary instrument of all animal motions, and in some measure the fountain of life, is a muscle, or rather a collection of several muscles, it is liable to the same indispositions with the other muscles of the body.

But the disorder, with which it is most frequently seized, is a palpitation, whereby its motion is interrupted for some little space of time. This proceeds from very different causes. For sometimes its fibres becoming paralytick do not drive the blood with sufficient force. At other times a polypus, formed in its ventricles or auricles, obstructs its action. Again, when the blood is too thick, and too much in quantity, it is with difficulty thrown into the blood-vessels. Likewise the motion of this muscle may be impeded by an over-great quantity of water in the pericardium; though this indeed be a rare case. Stony concretions also put it out of order. And it sometimes happens, especially in aged persons, that the tendons in the orifices of the ducts have acquired the hardness of bone; whereby their elasticity is destroyed, and too great a resistance is made against the propulsive motion. Nor is it to be omitted, that the want of a proper quantity of blood may occasion this disease. For when this is the case, the animal spirits are secreted too sparingly in the brain: whence the contraction of the heart is hindered, and there is an intermission in the pulse.

But it is to be observed, that this disease is generally a convulsion; and as in this state, the heart is not able to throw out a due quantity of blood at one contraction, it repeats its effort: a remarkable instance of what I said in the Introduction, that even those motions, which are called involuntary, are governed and altered by our mind.

And let me add, by way of prognostick, that this disorder, when it rises to a high degree, and frequently returns, generally ends in a syncope, or fatal weakness, which authors believe to be another disease of the heart.

Now the method of cure is to be varied according to the nature of each of these various cases. But this may hold good in general, that unless the patient be very weak, blood may be drawn; whereby the heart may be eased of part of the load of blood, which it is too feeble to throw into the arteries. And indeed,

indeed, I have often observed, that not only the palpitation of the heart, but even a syncope, arises from fulness: and thus this sudden fainting frequently succeeds the suppression of any customary discharge of blood, for example, from the nose or hemorrhoidal vessels: whence it follows, that blood-letting must be very serviceable for preventing this evil; but it will hardly bear any other evacuations. The paralytick weakness of the fibres requires the medicines directed in the chapter of the Palsy. Thick blood, which engenders a polypus, is corrected by attenuating medicines, as volatile salts and foetid gums. And blisters are very proper to stimulate and rouse the patient, especially in case of fainting attended with sleepiness.

C H A P. VII.

Of the diseases of the stomach and intestines.

ON the diseases of the stomach and intestines I have some things to propose, relating not only to what is to be done, but likewise to what is to be avoided. And first, although it be sometimes extremely necessary to evacuate by vomit the viscid phlegm, which loads the stomach; yet by too frequent vomits to invert that natural motion, by which the aliments are carried downward, is giving great disturbance and impediment to the concoction of food.

Infusions of the bitter herbs whet the appetite, and often help digestion: but there is reason to fear, that a long use of them may over-heat the muscular fibres. Upon which account, it is frequently more convenient to brace them with some acids, especially Mynsicht's elixir of vitriol; under this caution however, that they are not to be given, while the phlegm in the

stomach

stomach is tough. For a very common disorder of the stomach is relaxation; and that certainly requires the bracing of its fibres.

SECTION I.

OF A LOOSENESS.

A Looseness is easily stopped. I speak of that sort, which is without a fever: for when it comes on a fever, we are to consider, whether it may not prove a crisis of the disease. But when the case is a Looseness alone, it will be generally sufficient, after a vomit or two with Ipecacoanha wine, to purge with some doses of rhubarb; and then to strengthen the intestines with aromatics and chalk, or French bole.

THE BLOODY FLUX.

But the case is attended with greater difficulty, when the looseness is attended with a Bloody Flux, or severe gripes. For then the intestines are commonly ulcerated, and discharge blood; which comes away sometimes with liquid excrements, sometimes with slime, accompanied with fleshy particles. The patient is teized with frequent irritations to stool, and a pain in the anus; he discharges but little at a time, and his pain is increased by every stool: and as this disease arises from an inflammation, there is always some degree of fever with it.

Wherefore, to come to the cure, the first thing to be done is to draw blood. Then a vomit is to be given, for which Ipecacoanha wine is very proper, and to be repeated two or three times more, every third or fourth day.

During this course, and afterward, medicines, proper for stopping the Flux and healing the ulcerated membranes, are to be administered. And of this sort, I know none better than the following bolus, composed of the cordial confection and
French

French bole, each one scruple, Thebaick extract one grain ; given three times a day.

And it will be of service to inject clysters, either of fat broth with the addition of Venice treacle or electuary of scordium : or of the white decoction and starch ; or, in place of this last, of the chalk julep, with two or three grains of the Thebaick extract, when occasion requires it.

Lastly, I recommend as an useful remark, that this course is sometimes rendered ineffectual by a bad habit of body. In such cases, to the foregoing method it will be proper to add medicines, which correct the humours ; and indeed some doses of rhubarb, with a small proportion of dulcified mercury sublimated, commonly called calomel, will prove very conducive to that end.

Besides these diseases, a vomica, or internal suppuration, is sometimes formed in the stomach. This indeed seldom happens, but yet I have observed it more than once ; when the patient vomited up a mixture of blood and purulent matter in large quantities. The case is terrifying indeed, but yet, generally speaking, it is not attended with any great danger ; and it is cured by medicines which heal the ulcerated membranes, especially by Locatelli's balsam.

SECTION II.

OF THE ILIACK PASSION.

This disease, by the Greeks named *εἰλεὼν*, and by Celsus ^a the disease of the smaller gut, is very acute. It is a violent inflammation of the intestine, which, unless speedy relief be given, soon terminates in a gangrene, and death.

Wherefore blood must be plentifully drawn with great expedition, not once only, but twice, and generally thrice. Then the belly is to be moved. But this is very difficult to be done, because acrid catharticks cause too great an irritation, and are
thrown

^a Lib. iv. cap. 13.

thrown up by vomit. Therefore it is to be attempted by stimulating clysters and gentle catharticks; which are most likely to give mutual assistance to each others operation. Anodynes too are necessary, but mixt with the purging medicines. Thus a very proper medicine will be a scruple of the cathartick extract, with one grain of the Thebaick extract; and some hours after, two spoonfuls of infusion of senna, with the addition of a fourth part of the tincture of senna, to be taken either every hour, or every two hours, until the patient has had a sufficient number of stools.

If this course prove ineffectual, it will be right to order quicksilver to be swallowed down; which has a two-fold use in this case: to wit, by its ponderosity, that of restoring the natural motion of the intestines, which is inverted; and by its slipperiness, that of softening and driving downward the excrements which stop the passage. Upon these accounts it is to be given in large quantities, to a pound weight at least; and generally requires to be repeated. Nor ought the physician to use any long delay in trying this experiment, for fear of an actual mortification of the inflamed parts; whereby the coats of the intestine would be destroyed, and the quicksilver run into the cavity of the abdomen.

In fine, fomentations are of some service, particularly warm flannels soaked in spirit of wine; or, what Sydenham prescribes, a live puppy held constantly on the bare belly^b. But an immersion up to the breast in the warm bath is far more beneficial. And if the pain is not yet discussed, it will be proper to apply cupping-glasses, with slight scarifications, about the navel.

The same method of cure is to be observed in that severe disease by the French called *colica Pictonum*, and by our people in the American islands, where it is very rife, the dry belly-ach. For it is a pain, attended with a flame and inflammation, and a most troublesome costiveness.

^b See his works, Lond. 1705. p. 41.

SECTION III.

OF WORMS.

The belly is frequently the seat of Worms ; and they are of three sorts, the round smooth sort, the ascarides, and the flat or jointed Worms : children are chiefly troubled with the first and second ; and adults with the third and worst sort. These have been all treated of by many medical writers. But the learned Daniel Le Clerc has given the most accurate description of the flat Worm, illustrated with figures^c. And as he has refuted the erroneous opinions of some physicians concerning this creature, which seems to be an animal of a singular nature ; I have borrowed from him the following remarks. First it manifestly appears, that this is not a single Worm, but a chain of many lesser Worms, of that kind, which are called cucurbitinæ, linked together in a continued series. Secondly these latter are sometimes found, of a finger's breadth, lying single and separate in the intestines, and are so discharged by the anus. Lastly, the whole Worm formed of the concatenation of these has but one head, which is pretty sharp-pointed, somewhat resembling a beak ; which it fixes into the coats of the intestines, and sticking there very fast, sucks the chyle for its nourishment.

To these observations of Le Clerc I add some few from my own practice ; for I have seen, and cured this disease more than once. And indeed, it is a truth equally strange and disagreeable, that though the medicines have destroyed and brought away several of the small Worms, which are the component parts of the great one ; yet others daily breed in the body, and join themselves to the rest, in order to repair the breach, until the head is expelled ; and then at length the whole animal is discharged with it by the anus, and is frequently several feet long. But it

is

^c *Historia naturalis & medica latorum lumbricorum*, Genevæ, 1715.

is not at all surprizing, that the sharp beak above-mentioned should cause pain; and that the person, who entertains this devouring guest, and is under a necessity of supplying its daily food, should waste in his flesh, and even run into a decay.

Wherefore these pernicious broods of Worms are to be destroyed by all possible means; and this is easily done with regard to the smooth round sort, and the ascarides. Quick-silver in every form is destructive of them; and therefore it will be very proper to order a purge of rhubarb, with a small proportion of dulcified mercury-sublimate, which is to be repeated at due intervals; and in the intermediate days to give æthiops-mineral morning and evening. Moreover, it will be of service to drink spring-water, in which quick-silver has been boiled; and even sea-water alone. In fine, oil injected by the anus does good.

But the flat Worm requires a peculiar treatment; and after many years experience, I recommend the following medicine as very efficacious in this case.

Take filings of tin, and red coral, of each an equal quantity; pound them together into a very fine powder; of which one drachm, made into a bolus with conserve of the tops of sea-wormwood, is to be taken twice a day.

In fine, the same medicines, which have destroyed and cleared the bowels of these intestine enemies, are to be repeated from time to time, to prevent their return.

There is another Worm, which deserves to be taken notice of in this place, as being very different from those above-described, both with regard to its seat, which is not in the intestines, but in the limbs, and to the oddness of its nature. I mean that, which the Arabians have named *vena medinensis*, the Greeks *δρακόντιον*, and the Latins *dracunculus*. Avicen is the first author, who described this Worm, and to his description he has subjoined the cure^a. His Arabick text was rendered into

Latin

^a Lib. iv. Canon, sect. iii. tract. ii. cap. 21 & 22.

Latin by Georgius Hieronymus Velschius, and illustrated with an ample comment full of various erudition^c. I shall give in few words the substance of what occurs in Avicen. He says, that this disease makes its first appearance by a pimple, which rises on some of the limbs of the body, and in course of time swells into a blister: then it breaks, and there issues somewhat of a blackish red colour, which continues to come forth incessantly: sometimes it has a vermicular motion under the skin, as if it were a real Worm. Galen calls this evil an ulcer, which has a nerve brought into it from some neighbouring partⁱ.

But, in truth, this disease, frequent in Æthiopia, Africa and India, is a real Worm. And in particular, it is an aquatick insect, with a sharp head and slender body, which works itself into some of the limbs, the legs especially, of persons, while they are bathing or otherwise remaining in water. It is then very small; but by feeding on the membranes of the muscles, it grows larger in all dimensions; till at length, it gnaws the skin, and raises a swelling and inflammation, which suppurates; and then the creature puts forth its head, and is often found to be two or three feet long, and sometimes longer.

The cure proposed by Avicen consists both of internal medicines, and of external helps. For he advises the patient to take a drachm of aloes three days successively. But if the Worm withstands this medicine, and has actually begun to come forth; something should be provided, to which it may be fastened, and on which it is to be rolled gently and gradually, that it may all come out without breaking. The best thing for this purpose is a stick of lead, on which it is to be rolled; and it ought to be of a proper weight for pulling: then let it be drawn out gently for fear of breaking, &c. I have formerly seen in St. Thomas's hospital one instance of this case in a sailor lately returned from Africa.

^c Published at Augsbourg, 1674. 4to. ⁱ Definit. medic.

C H A P. VIII.

Of the DROPSY.

TH E R E are three species of Dropsy mentioned by physicians both ancient and modern; the leucophlegmatia or anasarca, the tympany, and the ascites. An excess of serosities is common to them all; which being collected form a swelling; either all over the body, as in the leucophlegmatia; or in the belly, which is sometimes so bloated, that a sound is frequently heard proceeding from the wind inclosed, as in the tympany; in which case there is also generally found some share of water, made perhaps by the condensation of the confined vapour: at other times the belly is so filled, that the fluctuation of the water may be easily perceived, either upon moving the body, or patting the part with the hand, as in the ascites.

The seat of the leucophlegmatia is in that membrane, which modern anatomists call the adipose, or rather the reticular or cellular membrane, and which lies between all the membranes of the body and the muscles.

The tympany is of more sorts than one. Sometimes the confined vapour bloats up the abdomen, which gives a hollow sound upon being struck. And that vapour is an exhalation from some mortified viscus; and therefore when let out, it is always extremely foetid. This is a rare case, and yet I have seen one remarkable instance of it in St. Thomas's hospital. It was in an old man, whose belly swelled to that degree of tightness, that it sounded like a drum upon being struck; nor could a passage be procured downward either for excrement or wind, though the most powerful catharticks had been given. Upon opening the abdomen after death, there flew out with noise such an excessively stinking vapour, that the surgeon cried out, he was poisoned.

soned. We soon found the source of this stench to be the colon, which was inflamed and mortified, and adhered to the stomach mortified likewise. But yet it sometimes happens without any putrefaction, that an elastick air engendered in the abdomen, and not finding any vent, pushes forward, and bloats up the integuments by its expansive force. And this is not pent up in the cavity of the belly, but in the very intestines; which it stretches to such a pitch, as to destroy their contractile power; and then their capacity is sometimes widened to an almost immense degree ^a.

The ascites, or third species of Dropsy, is formed three different ways. For sometimes the water is extravasated between the tendons of the transversal muscles of the abdomen and the peritonæum, and by separating them forms a tumour ^b; at other times the serosities getting in between the two laminæ of the peritonæum (for this membrane is double) forces them asunder, and forms to itself a large receptacle; but most commonly the water is collected, and stagnates in the wide cavity of the abdomen itself. And upon dissection I have sometimes observed this water to be very clear, with many little transparent strings, composed of slender vesicles that seemed linked together, floating in it; which were the coats of the bursted lymphatick vessels, whose valves separated them into different pieces, and formed hydatids.

But there is no species of Dropsy worse than that of the ovaries in women. For these organs first grow scirrhus, then they are inflamed, and at length gangrened; they likewise swell to a vast size, being gradually stretched by the juices issuing out of their bursted lymphaticks, which are very numerous. Hence this disease is very seldom cured.

These

^a See Memoirs de l'Academie Royale des Sciences, for the year 1713. pag. 235. and Philosophical Transactions, N^o 414.
Book iii. chap. 4.

^b See Cheselden's Anatomy.

These are the chief ways of forming collections of water in the belly, and I have seen instances of them all more than once : but the following case, which fell under my notice, while I was physician to the hospital, is very uncommon. A widow of forty-two years of age, who never had a child, complained of pains in her back, and difficulty of making water, for about twelve months ; after which time she perceived her belly to swell, and there soon appeared manifest signs of an ascites : wherefore she was tapped three different times ; but the waters soon collected again after each tapping, and she died in a fortnight or three weeks after the last puncture. Upon opening the body, there issued first from a cavity, formed by the separation of the tendons of the transversal muscles from the peritonæum, a great quantity of water, in which floated many large entire hydatids. And afterwards, upon cutting the peritonæum, seven or eight pints of a thickish and viscid humour were taken out, mixed with many corrupted glands. We wondered that none of the intestines appeared, which we sought in vain, until, cutting through a membrane as thick as leather, we at length found the stomach with all the intestines and omentum collected into a narrow compass, and, as it were, lying hid there. The membrane immediately inclosing them was the inner lamina of the peritonæum ; whose outer part being, as I have already observed, almost as thick as leather, did so far impose on us at first sight, that we took it for the whole peritonæum. Thus the three species of ascites above-mentioned visibly occurred together in this body, a curious, apposite, and useful case.

Besides all these collections of water, other parts of the body are also liable to the same distemper, as for example, the brain and testicles. But water is no where attended with greater danger than when collected in the breast : and this species of Dropsy most commonly happens to those, who have long laboured under a difficulty of breathing, that sort especially which arises from polypi in the blood-vessels ; while the serosities of the blood

transude through the membrane of the lungs. I have seen several cases of this kind, where there was from a pint to a quart of water collected, sometimes in one side of the breast only, sometimes in both, and sometimes also in the very mediastinum. Now, as this water encreases daily in quantity, by hindering the play of the lungs, it at length stops respiration, and the patient dies suddenly. In fine, in persons who had been long subject to a palpitation of the heart, and shortness of breath, the pericardium itself has been found after death vastly distended with water.

But it is time to come to the cure of these Dropsies. In the leucophlegmatia, an incision ought to be made in the inside of the leg, two fingers breadth above the ankle, as far in as the cellular membrane, and no farther; in order to serve as a drain for the water, which should run for some days. And during this time, let the leg be fomented with a decoction of emollient and warm herbs, with an addition of camphorated spirit of wine; which method I have often found to be of great service, not only in this species of Dropsy, but even in the ascites itself: nay, in some cases it has proved an absolute cure, by draining off an almost incredible quantity of water for many days together. But care must be taken, not only in this particular incision, but in all others that are made in any part of the body for drawing off the waters, not to over-exhaust the patient's strength; which is as much affected by this evacuation, as if the same quantity of blood were drawn. Wherefore the patient is to be supported by all possible means, lest what was intended for his cure may hasten his death; whereof I have seen two instances, one of which, indeed, happened by my own fault, in not estimating the patient's strength with sufficient caution, and the other by the rashness of a surgeon. And yet it is astonishing, how great a quantity of water, drawn off in this manner, hydropicks sometimes bear to lose, with ease and benefit: as will appear by this singular case.

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A gentlewoman, related to me, of near fifty years of age, and of a good strong habit of body, was seized with an anasarcal and ascital Dropsy at the same time; whereby her belly swelled to such an excessive degree, that when she lay in bed she was quite oppressed by the weight. When her case was judged almost desperate, I gave it as my opinion, that the only hopes, or rather chance remaining for her life, consisted in letting out the water by incisions made in the small of the leg. To this she obstinately refused to submit, saying that she was now gone a great way on her journey out of this miserable life, and did not chuse to go back. But at length she was prevailed on by the importunities of her friends; and a small incision was made in each leg, in the manner above-described; through which issued a gallon of water at least every day for ten days together. In the mean time, regard was had to her stomach and strength. Warm fomentations were applied to the part; and she took twice a day a draught of infusion of bitter herbs in water, such as leaves of Roman wormwood, lesser centaury, gentian-root, and lesser cardamom-seeds, with an addition of chalybeate wine. And every night she drank the following draught, which I have frequently ordered in hydropick cases, and found it very efficacious in promoting urine.

Take of oxymel of squills one drachm and half; simple cinnamon-water, an ounce; compound spirit of lavender, syrup of orange-peel, each one drachm, mix.

She mended daily, and in time perfectly recovered her former state of health. But she was purged with proper catharticks, as soon as her strength would bear them. And indeed this disease requires pretty powerful catharticks, and a frequent repetition of them; the chief of which are elaterium, calomel, and jalap. Wherefore these were given at proper intervals: and the other medicines above-mentioned were continued daily for a long time; especially, the diuretick draught, which she never omitted for a whole year. After this course she continued in
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good health for five years, at the end of which she was seized with an acute disease that carried her off. Upon the whole, I make no doubt, but that that deluge of waters flowed partly from the cellular membrane, partly from the sack, formed by the tendons of the abdominal muscles and the peritonæum, or by the distension of the two laminæ of the peritonæum.

Order brings me now to the tympany. And first, that species, which, as I said above, proceeds from a mortification of any of the bowels, is absolutely incurable: but that which is occasioned by air, engendered and pent up in the very intestines, is to be treated with moderate catharticks frequently administered, and carminatives, to expel the wind, interposed; together with diet of very easy digestion. Likewise, bodily exercise ought not to be neglected; and it will be of use to throw up large clysters of warm water; and also, what Celsus advises, to make ulcers in several parts of the belly with a red-hot iron, and keep them running a good while. But if this operation should appear cruel, it will be proper to lay blisters on the abdomen, and repeat them now and then.

The ascites is always a dreadful disease, whether its seat be on the outside of the peritonæum, or within it, or in fine, in the cavity of the belly. Now, it is extremely material in this case, to consider, what evacuations the patient is capable of bearing. For, when he is weak, violent purging is very prejudicial; and the more the serosities are drained out of the intestines, the greater quantity of them flows into the belly. As soon as the physician observes this to happen, he ought to desist, and to try to carry off the redundant water by the urinary passages. But all diureticks, even such as are accounted the most powerful, are of uncertain effect in these cases; for those which answer in one patient fail in another; wherefore various sorts are to be tried. Yet, generally speaking, those, into which squills enter, are the most efficacious. Of these the chief are, either the draught

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with oxymel above-described, or the fresh root itself, given in a small quantity, as in the following bolus :

Take of the fresh root of squills five or six grains ; of compound-powder of arum half a scruple ; ginger-root five grains. Pound them together, and with syrup of orange-peel make a bolus, to be taken every morning.

Or, in fine, vinegar of squills, which will be less disagreeable to the stomach, and better adapted to the intention, if it be given in this manner :

Take of lemon-juice, six drachms ; of salt of wormwood half a drachm : mix, and add of simple cinnamon-water, an ounce and half ; syrup of orange-peel one drachm ; spirituous water of pepper-mint, half an ounce ; vinegar of squills, a drachm, or a drachm and half ; make a draught, to be taken twice a day.

An infusion of broom-ashes is also beneficially ordered by physicians upon account of its diuretick quality ; and if it be mixed with a little wine, it will often make a good common drink for the patient.

Upon this occasion, I cannot omit recording a very remarkable case of a lady of quality of my acquaintance. This lady, when about fifty years of age, had a hard swelling in one side of the abdomen, which, without doubt, was one of the ovaries grown to a very large size ; and its lymphaticks bursting spued out their contents, and gradually formed an ascites. Purgatives and diureticks of all sorts were tried in vain. She was tapped three times, and soon filled up again. It happened at length, that a poor country-woman came to see her, who, observing her in great pain from the tension of her belly, easily persuaded her to take, every day, night and morning, a spoonful of whole mustard-seed, and drink on it half a pint of a decoction of green broom-tops. After three days taking this bitter potion in this manner, she found herself vastly relieved ; and her thirst, which was very troublesome, was entirely appeased.

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This medicine sometimes gave her stools for two or three days successively, and she made five or six pints of water at least every day. She continued this course for twelve months, and was cured without any return of the disease. Wherefore Hippocrates wisely advises physicians, to enquire even of the lower class of people, if they know any thing useful for the cure of diseases^d.

It will perhaps seem an uncommon, and even dangerous practice, to order narcoticks in this disease: but yet they are sometimes so useful, that they may be placed among diureticks. For in case of great pain, they often promote a discharge of urine; which effect they produce, in my opinion, purely by relaxing the fibres of the renal ducts, which are always constricted by pain: as will appear by the following remarkable case.

A certain robust, sober, temperate man, of about forty years of age, was afflicted with an ascites and tympany together. The disease was owing to a violent blow, which he had received about six weeks before, in the right hypochondrium. The swelling of his belly daily encreased, with very severe pain, great thirst, and thick, high-coloured urine rendered in small quantities. The most powerful diureticks, as Venice-soap, lixivial salts, balsam of Gilead, nitre, and the like, were prescribed by another physician of great experience and myself; but all in vain: and strong catharticks made the disease grow worse. He was ordered to be tapped, but his friends would not consent. Wherefore, as his pain was now become intolerable, and there were no hopes of his life, I thought of anodynes, in order to procure him some ease, at least, in his last moments. And accordingly, I ordered him the following night-draught:

Take of pepper-mint water, one ounce; simple cinnamon-water, half an ounce; spirituous cinnamon-water, two drachms; Thebaick tincture, forty drops; ley of tartar, half a drachm; syrup of marsh-mallows, one drachm; mix.

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^d Μη δυνέειν παρὰ ἰδιωτέων ἰσχυρεῖν, ἢν τι δοκέει συμφέρον. Lib. Præcept.

This procured him most unexpected ease, and some sleep, to which he had been long a stranger; and he made that night, at different times, a quart of water at least. This sudden change surprisingly raised his spirits. And as the patient found, that, while his ease from pain lasted, he had considerable discharges both by urine and stool; but, that he filled up again, when the effect of the anodyne was over; the same draught was ordered to be repeated every eight hours, and in a little time, it was thought sufficient to give it but twice a day. But, whereas his appetite was diminished by the constant use of this medicine, he took, once or twice a day, some spoonfuls of a chalybeate bitter infusion; without neglecting the paregorick draught, whenever the pain returned. And this course was attended with such success, that to complete the cure, he was ordered pills, composed of storax pills one part; Peruvian bark two parts, made up with Chio-turpentine, to be taken twice a day; whereby he perfectly recovered.

Dr. Willis^e has given a case, quite similar to this, to which I refer the reader; as also to what the learned Spon has published on the same subject^f. For the Dropsy, to the cure of which by twenty bleedings he was an eye-witness, as well as that above-described, may justly be suspected to be owing to the præternatural heat and inflammation of the abdominal viscera.

Having hitherto treated of things proper to be taken in this disease, it may not be amiss to say a word or two on a very different method of cure, which is, by abstaining from all kinds of drink for a long time; for even this method has had its abettors among the faculty. But certainly, it is very difficult to be strictly pursued, as the patient is generally subject to excessive thirst; which, if he be debarred from quenching, he suffers such uneasiness, that possibly he may not think life worth purchasing at so dear a rate. Nevertheless, I have known two persons

^e See Pharmaceut. rational. Part i. sect. vii. cap. i. aphor. 81.

^f Aphor. nov. sect. v.

sons labouring under a very severe ascitical Dropsy, who had resolution and patience enough strictly to practise this self-denying method, and were both perfectly cured. And their way of assuaging their thirst was, by washing their mouth and throat with the juice of four apples, or lemons, and now and then swallowing a very small quantity of it.

But if the belly cannot be drained of its load of water, either by incisions made in the legs, as proposed in the anasarca, or by any of the other helps above-mentioned; there will be a necessity of taking a shorter course of relieving the patient, I mean, by tapping. For this operation sometimes preserves, but seldom kills; and always considerably eases the pain occasioned by the tension of the abdomen: besides which, it has this great use, that it affords time and opportunity for administering proper medicines.

I know, that physicians are often averse to this operation, grounded chiefly on the following reason. It is in vain, say they, to let out the water, since the injured internal parts furnish a new supply of it: moreover, if it be let out by parts at different times, the belly soon fills up again; but if it be drawn off all at once, the patient dies immediately. Now, most certain it is, that when the bowels are mortified, the case is past all hopes; that letting out the water by parts is of no service, and drawing it all off at once was commonly pernicious. Wherefore, in the year 1705, I began to investigate the cause of so great an evil, in order to guard against it; and, if I am not mistaken, it is as follows. By the long distension of the abdomen from the inclosed water, the diaphragm is thrust up too high; the muscles of the belly are stretched, the blood flows with greater freedom through the upper blood-vessels, than through the lower; and in fine, the water by its pressure occasions some new disposition of the adjacent parts; whence upon letting out all the water at once, the diaphragm immediately moves lower down, as in its
natural

natural state it usually does ; the blood rushes with unusual impetuosity into the lower or descending vessels, and by the removal of the pressure, the fibres suddenly lose the extension which they had acquired, and the heat which the inclosed water had given them : hence arises a swooning ; which returning often, and with increased violence, throws the patient into cold sweats, and soon carries him off. Now, the best way of preventing this fatal consequence seemed to be, to press the belly hard with both hands, from the upper part downward, while the water was issuing ; and after it was all come away, to swathe the belly tight with a bandage.

I resolved to make the first trial of this method in the hospital ; and soon found a hydropick woman, who was a proper subject for my purpose. Wherefore she was tapped, and as soon as the water began to issue from the puncture, I carefully laid my hands above the navel, one on each side, and pressed the belly downward ; and made the surgeon do the same thing below that part. But this I observed, that, if I took off my hands but for a single moment, the patient immediately fainted away. When all the water was drawn off, a piece of flannel, dipped in spirit of wine, was laid on the abdomen, and then a bandage was rolled tight all over it. To our great joy, the experiment succeeded according to our wishes. The patient made water plentifully, her appetite returned, she soon gained strength, and was perfectly cured without a relapse. Of such consequence it is to have investigated the true causes of things.

From that time, not only our own, but also foreign physicians have followed this method ; and sometimes, indeed, as it frequently happens in new experiments, with too much boldness. For, in cases of diseased livers, abscesses of the stomach, and bad habits of body, there is little or no reason to hope, that it will be attended with success. Wherefore, some precautions are always necessary to be used before attempting it ; the most material of which

which are laid down by those ingenious surgeons, Mr. Cheselden^z and Mr. Sharp^h.

After all, I must confess, that with what prudence soever the physician discharges his duty, the Dropsy often returns. But, that notwithstanding, a high value ought to be set on this discovery, by means whereof I have known many lives not only prolonged for several years, but made tolerably easy, and sometimes comfortable. Of which truth I could produce many examples, but shall content myself with the following one.

A widow lady, whose opulent estate served to render her virtues more conspicuous, fell into an ascites, in the fifty-first year of her age. For this she was tapped; but as she soon filled up again, the operation was repeated once a month for the first year; and at each tapping, one with another, there were drawn off forty-four pints of water. The next year she was likewise tapped every month, and the whole quantity, being equally divided, made twelve pints each week. The third year the quantity of water began to diminish, so that there was but twenty-four pints for every month. And in the fourth and fifth years, and seven months of the sixth, in which time she underwent thirty tapplings, each tapping amounted only to sixteen pints. After the last time, she began to grow weak and waste away; and she was seized with almost a constant difficulty of breathing, as we observe in a Dropsy of the breast, attended with frequent faintings; whereas before, through the whole course of the disease, in the intervals of tapping, she was chearful in conversation, used exercise, and even diverted herself with dancing. But, now life began to sit heavy upon her, and she died at length, a very easy death. Now, it is very surprising, that a human body, in that space of time, could furnish such a vast quantity of water, to wit, one thousand nine hundred and twenty pints; and it is my opinion, that this water was first collected in the ovaries.

In

^z Anatomy of the human body, Book iii. chap. 10.
operations of surgery, chap. 13.

^h A treatise on the

In fine, this good lady, for the information of posterity, ordered, by her will, that the following English inscription should be engraved on her monument.

Here lies Dame MARY PAGE,
Relict of Sir GREGORY PAGE Baronet.
She departed this life March iv. MDCCXXVIII.
In the LVI year of her age.
In LXVII months she was tapped LXVI times,
Had taken away CCXL gallons of water,
Without ever repining at her case,
Or ever fearing the operation.

And this monument is now to be seen in Bunhill-Fields.

Equally remarkable, but happier in the event, is the case contained in the following account. A maiden gentlewoman of seventeen years of age, observed, that her belly swelled gradually, and that she made but little urine. She took various medicines, but still grew worse for a whole year; when her abdomen was as much distended as if she had been far gone with child. At this juncture she married, in hopes that a husband would prove her best physician. But it happened quite otherwise; the Dropsy went on encreasing for three years, when it came to that height, that there was reason to fear her belly would burst. Her pain becoming now intolerable, she desired me to order her to be tapped by a surgeon of the hospital, who was said to have good success in that operation; in order to give her some ease at least. Whereupon, as I did not care to be thought to kill a patient, whom I could not cure, I told her, that it could not be done in so emaciated a body without extreme danger. However, the miserable patient still continuing to urge me with earnest intreaties, not to abandon her to constant tortures and a lingering death, I granted her request; and at one tapping, managed in the manner above-described, there were drawn off sixty pints of clear

clear water, quite free from any offensive smell. From that time she gathered strength daily, the disease never returned, and at the end of ten months she was delivered of a lusty boy, and has since had several children.

In fine, a strong argument for the necessity of this operation is, that it is much safer, under proper restrictions, to let out the water, than to wait till it bursts the belly, and comes forth. For this case sometimes happens, and is always attended with the utmost danger. However, I have seen one instance of a recovery from it, in a woman, to whom I was called. Her belly was so vastly stretched with water, that I pronounced the case incurable; because she seemed not to have strength enough to bear the proper evacuations: but I was mistaken. For, in a few days, hearing that she was still alive, I made her another visit, and was much surprized on seeing two vessels full of water, one containing twelve pints nearly, and the other six. The first quantity came away in one day through a crack in the abdomen near the navel; and the second issued the next day from another crack, which happened near the same place; thus nature wisely divided her remedy, and allowed it two days to operate. As I now found the patient excessively weak and faint, I ordered her nothing inwardly but cordials; but gave directions to foment the abdomen with spirit of wine; and withal, made my prognostick that she would soon die. But, *mulieri, ne mortuæ quidem, vix credendum est*; I was mistaken a second time; for I saw her some months afterwards, quite recovered; nor did she ever relapse, as far as I could learn; and the cracks and burstings of her belly united, without any other application but that above-mentioned.

I close this long chapter with the history of a case, whereby it will appear, that nature sometimes employs a very different method from that above-described, to ease herself of her load. I attended a certain merchant for an ascitical Dropsy, with another physician of great experience; and after trying the usual

remedies to no purpose, we resolved upon the paracentesis, as the ultimate resource. Accordingly the operation was performed, and about twenty pints of thin clear water were drawn off. In a few weeks his belly filled again. Whereupon, we agreed to meet the surgeon the next morning, in order to draw off the water by a second tapping. As soon as we came to the patient, he looked at us, and smiled; saying, that he had no occasion for any sort of assistance; and stripping off the cloaths, he shewed his abdomen, which was soft and relaxed. At this we were vastly surprized, and having asked him if he had had any kind of evacuation in the night, he assured us that he had had none, either by stool, urine, or sweat, more than usual. Wherefore all the water must have been absorbed by the glands and capillaries of the peritonæum and adjacent membranes. But afterwards this patient very imprudently committed himself to the care of a certain quack, who, to prevent a return of the disease, gave him very strong catharticks, which so exhausted him that he soon died consumptive. Yet, upon dissection, there was little or no water found in the abdomen.

Anatomists have long since discovered, that water is absorbed from the belly into the circumjacent parts. For if a pint of warm water be injected, through a small wound, into the abdomen of a live dog, and his abdomen be laid open a few hours afterwards, not a single drop of the water will be found therein. Thus, as Hippocrates has justly observed, every part of the body, both outward and inward, is perspirableⁱ. But I refer the reader to the perusal of what the learned Dr. Abraham Kaav has published on this subject, who demonstrates that the humours are admitted into, and transude through all the membranes of the body, both in health and sickness^k.

ⁱ "Ἐκπνέον καὶ εἰσπνέον ἔστιν ὅλον τὸ σῶμα. Epidem. vi.
Perspiratic diæta Hippocrati per universum corpus anatomicè illustrata. Leyden,
1738.

^k In a book, intituled,
Perspiratic diæta Hippocrati per universum corpus anatomicè illustrata. Leyden,
1738.

C H A P. IX.

Of the diseases of the liver.

THE Liver is liable to very many diseases ; because the affections of this organ are for the most part owing to the bile, which may be vitiated several ways. But the most common of all is the jaundice ; and as what authors have written on this distemper has not given me thorough satisfaction, I think proper to enquire with some care into its nature.

SECTION I.

THE JAUNDICE.

The bile is a kind of natural sapo, that is, a mixture of oil, water, and salt, both volatile and fixt, separated from the blood in the liver for various uses of the animal body. And as the blood itself may be vitiated many ways, it is no wonder, that this humour is sometimes rendered unfit for its offices. Now, it is often faulty by its lentor or viscosity, and sometimes also by its excessive thinness. In the first case, the secretory glands of the bile are obstructed, and the small quantity of it that is secreted stagnates in the hepatic ducts ; whence the liver grows hard, and under its tunicle are formed whitish concretions, resembling hard soap. But this disease arises, not only from the viscosity of the bile, whereby it stops in its passage, but also from its want of due consistence. For here the volatile salt, which is one of the compounding principles of the bile, overabounds ; whence the bile becomes too thin, hot, and irritating to the intestines. In the former case, the body is too costive, and the fæces are hard, and of a clay-colour ; in the latter a

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diarrhœa,

diarrhoea, attended with a fever and thin yellow stools, constantly teizes the patient. Persons who spend their lives in a sedentary manner, without proper exercise, are most liable to the former; because the oily part of the bile grows too thick and viscid for want of a due proportion of salt: and those who render their faculties useless, by too high feeding and drinking spirituous liquors, are generally most exposed to the latter.

But there is another species of Jaundice, owing to a very different cause from those above-described, and that is, to nervous spasms; when the subtile, elastick fluid of the nerves, by becoming too acrid and irritating, constricts the bile-ducts to a degree of hindering its passage through the liver; and consequently, it must remain in the blood, and thence be thrown on the different parts of the body. That something of this same kind follows upon violent colick pains, and the bite of the viper, we have shewn in another place^a:

I must also observe, that there sometimes happens another sort of constriction, occasioned by the scirrhusity of the abdominal glands; in which case, though the liver and gall-bladder be loaded with bile, yet no part of it can pass into the intestines; of which, I formerly saw a remarkable instance in the hospital. It was in a working man of forty-two years of age, who, five months after recovering from an acute fever, was seized with an inflammation in the right hypochondrium; of which, when he was relieved, he fell into an obstinate Jaundice, with costiveness and clayey stools, and died in a short time. Upon opening the abdomen, we found four pounds of pure blood, in appearance at least, floating in it. We wondered whence this blood proceeded, but soon observed some little membranes, which seemed to be the pieces of a bursted sack; and the omentum was mortified in this place. The pancreas was not only scirrhus, but also cancerous; for, upon cutting into it, there flew out into the surgeon's face some drops of serosity of so acrid and corrosive a nature,

^a Mechanical account of Poisons, Essay I. edit. iv.

nature, that they burnt the skin like oil of vitriol. The spleen was scirrhus likewise. The gall-bladder, was very large, and full of bile; not yellow, but of a dark green, and too viscid. There was no scirrhusity in the liver; but in what part soever it was cut, the same sort of bile issued. In fine, we observed, that every part of the body, membranes, fat, glands, nay, the very substance of the ribs, was of a yellow hue, except the muscular fibres alone, which were not in the least tinged. Upon pressing the gall-bladder with the fingers, we could not force one drop of bile into the intestines; for at the union of the hepatic duct with the cystic, the passage was so vastly streightened, that it would not admit a style. And my reason for relating this case is, to make appear, from how many different causes, and some of these fatal, this disease may arise.

A disease, attended with such a variety of circumstances, requires different methods of cure. In case of costiveness with ash-coloured or whitish stools, saponaceous medicines both alone, and joined with rhubarb, are necessary. When the belly is too loose, the looseness is rather to be moderated than stopped; which is best done by rhubarb with the admixture of an anodyne. But pectoricks are never more proper in this disease, than in those cases, which we have said to be owing to a constriction of the biliary ducts by nervous spasms. But in every kind of Jaundice, attended with actual inflammation, blood is to be drawn; and generally speaking, a vomit is to be given.

This inflammation frequently suppurates, and turns to a vomica; from which, if pure white matter issues, it is a promising sign; because the evil lies in the tunicle or outward membrane. But if the whole substance of the liver is consumed by it, the patient labours under a slow fever and great anxiety for a good while, and then dies. This cruel disease is very frequent in the East-Indies, as I have been assured by travellers; and is sometimes cured by applying a caustick to the part, and letting out the humour. But the ulcer must be kept open a considerable time,

as in the case of issues. This disease is taken notice of by the learned Bontius, who gives a method of cure, not much unlike that above-described ^b. And Celsus observes, that the same method was formerly practised by some physicians ^c.

Lastly, for correcting the bile itself, nothing is more useful than the following draught.

Take of lemon-juice six drachms; of salt of wormwood, half a drachm; of simple cinnamon-water, one ounce; of double-refined sugar, one scruple; mix.

And it will be of service likewise, in case of a looseness, if its irritating quality be duly checked by opiates. Upon the same principle Mynsicht's elixir of vitriol, taken in Bath or Spa-water, is a very good medicine.

SECTION II.

THE DIABETES.

The Diabetes is an excessive discharge of urine, of the taste, smell, and colour of honey; and that it is not a disease of the kidneys, as has been generally thought, but of the liver, I think I have proved elsewhere beyond contradiction ^d. I shall here avoid a repetition of what I then said on that head; and shall only add one medicine more, viz. aluminated whey, which is made thus:

Take four pints of milk, boil it a little, and turn it with three drachms of alum.

If four ounces of this be taken three times a day at least, it will contribute much towards stopping that flux.

Now, if it be asked, whence can so great a quantity of water be supplied, as is discharged in this distemper; my answer is, that we find by easy experiments, that certain bodies sometimes attract,

^b See Hist. nat. & medic. Ind. orient. Lib. ii. cap. 8.

^c Lib. iv. cap. 8.

^d Mechanical account of Poisons, Essay I. edit. iv.

tract, and imbibe the watery particles floating in the air; whereby they are more or less increased in bulk and weight. Thus the salt of tartar, exposed to moist air, encreases so prodigiously, that a single pound of it duly calcined swells to ten pounds weight. Therefore why may we not say, that some of the vapours of the ambient air enter into the human body, when properly disposed to receive them; and these, being added to the serosities, which are to be conveyed to the kidneys, and there secreted, encrease their quantity? Upon which account, as cold and moist air is very improper for persons in this distemper; so they ought, if practicable, to go into a warm and dry climate.

In fine, in order to account for the infrequency of this disease among the antients, which was such, that Galen says he saw it but twice only^c: I am of opinion, that this proceeded from their manner of living, so very different from ours. For I have said, that this disease most frequently happens to those, who without due exercise, indulge themselves with drinking vinous liquors; and then quench their thirst arising from these, by too great a quantity of such as are cooling. Whereas, the antients, though perhaps too much addicted to wine, were yet more prudent in this particular; for after a debauch, they returned to temperance by degrees, cooling their bodies gradually, and quenching their thirst with warm drinks, or such at least as were not actually cold.

^c De locis affectis, Lib. vi.

C H A P. X.

Of the diseases of the kidneys and bladder.

BEFORE I proceed to the cure of the diseases of the kidneys and bladder, it will be proper to premise a few things concerning these diseases, the nature of which does not seem to have been explained by medical writers with sufficient perspicuity; though the knowledge of this point is very material for the cure.

I well remember, and have mentioned it upon another occasion ^a, that the dissection of a boy about five years old, who died of severe nephritick pains, at which I assisted many years since, afforded me an opportunity of observing the various degrees by which the human calculus had acquired the hardness of stone. For the kidneys and ureters were quite stuffed with a calculous matter; and it was very instructive, to see the different degrees of concretion in the several parts of it, from a clear limpid water to a milky liquor, which shot into slender branchy crystals; and these coalescing became a hard friable substance.

Helmont, well versed in chemical experiments, says ^b, (and I think not without reason) that the matter of the calculus is a certain tartar formed in the kidneys by a præternatural coagulation. For this opinion seems to be confirmed by the analysis of the stone made by fire, and compared with that of tartar from Rhenish wine. This experiment was made by the ingenious Dr. Stephen Hales ^c, who found in tartar of Rhenish wine, that the third part of the whole mass is an elastick air; and that above half the calculus consisted of the same sort of air; which proportion of air he could never find in any other bodies.

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^a Influence of the Sun and Moon, page 186.
paradoxum numero criticum.

^b See Supplementorum

^c Statical essays, vol. i. p. 184 and 193.

Therefore, may we not conjecture with probability, that the proximate cause of this disease is tartarous salts conveyed out of the blood into the small ducts of the kidneys? For it is the nature of these salts to contain and imprison a considerable quantity of that subtil matter, which the illustrious Newton has shewn, besides its other properties, to be the cause of the cohesion of bodies^a. Thus the calculus is a substance composed of earth, and a very large share of air, concreted in the renal ducts; and either remains therein, or drops down into the urinary bladder. Upon the whole, I have been the more particular on this head, in order to shew the several ways of treating this distemper.

And first, to prevent those salts from shooting into crystals, lixivial salts seem to be extremely proper. Next, to keep the crystals from coalescing into a calculous substance, oily medicines are very efficacious. And this rule ought always to take place with regard to diet as well as medicines.

But when calculous concretions are actually formed in the kidneys, and are to be brought away by the ureters, the case requires very prudent management. It is a very common error in practice to give strong, forcing diureticks, with an imaginary view of driving out the gravel with the urine: whereas, this intention is answered with greater safety, in most cases, by relaxing and lubricating medicines; especially, if, in case of violent pain, bleeding be premised, and anodynes interspersed. For a stone is never forced out, while the patient is in great torture; though, when the pain ceases, it sometimes comes away unexpectedly, and almost of its own accord, with the urine. And the reason of this is, that pain constricts the fibres of the parts, which resume their natural state, and perform their functions properly, when the troublesome sensation is over. Wherefore, three or four grains of opium, dissolved in five or six ounces of the common decoction, may be given by way of clyster, which

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^a See The life of Mr. Boyle, prefixed to his works, page 70.

will greatly relieve the pain, and sometimes procure greater advantages. However, there are conjunctures, after the pain is abated, when powerful diureticks may be administered; but with this precaution, that as soon as they have had their effect, they are no longer to be continued.

All this time the body should be constantly kept open; wherefore, in case of costiveness, it will be expedient to give a turpentine clyster; and sometimes to purge gently with infusion of senna and manna; but strong catharticks are to be avoided.

Of the lubricating medicines above-mentioned the chief are, oil of sweet almonds, syrup of marsh-mallows, emulsions made with almonds, and the like; to which may be added, the use of the warm bath: but among the powerful diureticks, turpentine and soap are the best.

Such is the course to be pursued in the paroxysm of the disease. But out of it, the patient should use bodily exercise, especially riding every day, but so as not to fatigue: his food should be mild, and of easy digestion; and his drink either small wine and water, or new soft ale, which will be rendered better and wholesomer, if ground-ivy leaves be infused in it, while it is working. Mead is likewise a proper drink; for honey is an excellent diuretick. A spoonful also of honey in a glass or two of the infusion of marsh-mallows roots is an admirable cleanser of the kidneys, if used for a constancy. The wines ought to be the softest and smoothest that can be had, and the lightest; clearest river or running-water is preferable to all other. For, as Pliny says, “those springs are particularly
“condemned, the waters of which line the vessels in which
“they are boiled with thick crusts.”

But particular care should be taken, not to put the patient into a course of powerful diureticks, with a view of preventing the gravel from concreting in the kidneys: because, whatever great things may be said of this sort of medicines by ignorant pretenders,

pretenders, they certainly injure the parts by their heat and acrimony. Nor can I avoid observing, though I am extremely sorry for the occasion, that some gentlemen of the faculty a few years since acted a part much beneath their character, first, in suffering themselves to be imposed on, and then, in encouraging the legislature to purchase an old woman's medicine at an exorbitant price; by vouching, that it was capable of breaking the stone in the bladder, and bringing away the fragments with the urine. This medicine is a composition of soap and lime made of different shells, which every body knows to be highly caustick. And while the scheme was carrying on, some stones cut out of the bladders of patients, who had used the medicine, were very industriously handed about, as a testimony of its lithontriptick quality; because these stones had inequalities, and holes here and there in their surface, which were asserted to be erosions made by the medicine. But those gentlemen ought to have known, that stones are sometimes naturally formed in the bladder with such inequalities and pits on their surface, as may be mistaken for real erosions: several examples of which have fallen under my own observation. So great is nature's variety in forming calculous concretions. But upon this subject, I refer the reader to a very useful book, published some years since by a skilful anatomist and physician; in which both the mischiefs done by this medicine, and the artifices employed to bring it into vogue, are set in a clear light^f.

Now, whereas such vast encomiums were bestowed on this new medicine, as it was then called; it was no way strange, that our legislature should desire to purchase the manner of making it at almost any price, in order to publish it for the benefit of the commonwealth. And indeed, the purchase redounds as much to their honour, as it does to the discredit of their advisers; who ought to have known, that things endued with such a corrosive quality, as to be able to dissolve the stone,

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could

^f Parson's Description of the human urinary-bladder, &c.

could not lodge in the bladder without injuring that organ. Upon the whole, that composition, under due management, may be of some service in expelling gravel by the urinary passages; but it will never be able to break calculi of the hardness of stone: and besides, its long continued use must be attended with great danger, for the reasons above-given. And as for its substitute, the soap-leys, though it be a medicine of a more commodious form for taking; yet it will not prove much safer in its consequences, for the same reasons.

Nevertheless, as nothing ought to be disguised, no truth concealed, in a matter of such moment; I think proper to take notice of what the learned Dr. Robert Whytt of Edinburgh found by experiments relating to the present enquiry*. For that gentleman, after seriously considering the inconveniencies, and sometimes the mischiefs also, of this celebrated specifick, resolved to omit the soap, and try what virtues lime-water might have in dissolving the calculus. His first experiments were made on several fragments of calculi with lime-water from common quick-lime; and afterwards resolving to try the power of animal-lime, he repeated them with lime-water, made with oyster-shells and cockle-shells well calcined, by pouring seven or eight pints of water on one pound of the fresh-calcined shells. The experiments succeeded with both sorts; but he soon found, that the oyster and cockle-shell lime-water possessed a much greater power of dissolving the calculus than that of stone-lime. Then he proposes the method of drinking the shell lime-water, the quantity of which may amount gradually to four pints every day for adults, and for children less in proportion: and he concludes with instances of the happy effects of this method.

His whole dissertation is very well worth the perusal. And I have given this short account of his method with the greater pleasure, because an eminent physician here in London, lately assured

* Medical essays, Edinburgh, vol. v. essay 69.

assured me, that he cured a certain merchant, who was grievously afflicted with the stone, by this very method: whereby he discharged by urine a great number of small pieces, some like the coats, others like small nuclei of stones. But it is never to be expected, as I have said above, that stones, which have acquired a degree of hardness little inferior to flint, can be broken or dissolved by any medicine whatsoever.

Therefore I heartily congratulate my fellow-citizens upon the skill and dexterity of our surgeons, who have invented a new way of cutting for the stone with greater safety and dispatch^h. For now, not only children and youths, but also persons advanced in years, may submit to this operation without great danger: and in case the stone prove too big to be extracted without tearing the neck of the bladder, it is now no longer necessary to split the stone (before the extraction); the invention of which is ascribed to Ammonius, a Greek physician, who from thence was surnamed (λιθοτόμος) the lithotomistⁱ.

C H A P. XI.

Of the diseases of the eyes.

THE diseases of the Eyes have been treated of by medical writers with such care, that I think it almost unnecessary to say any thing here concerning them. Among the antients Celsus^a in particular, and among the moderns Plempius^b, have most accurately enumerated and distinguished them. The former indeed was possessed of the works of the Greek physicians and

^a See Cheselden's Anatomy, chap. vi. of the fifth edition.
Lib. vii. cap. 26.

^a Lib. vi. cap. 6.

ⁱ Celsus,
^b Ophthalmographia.
Lovan, 1659.

and surgeons, which are not come down to us, and out of which he selected several very good medicines with great judgment: and the latter has made use of all the modern discoveries, to improve the practical part. To these two authors I would add a book, composed by two eminent mathematicians; in which every thing relating to vision is explained with great perspicuity^c. And Dr. Porterfield's dissertations on this subject^d are extremely worthy of a serious perusal.

Wherefore I shall content myself with making a few remarks on some very considerable diseases of the eyes, the nature of which has not been sufficiently understood by the generality of practitioners.

SECTION I.

OF THE GUTTA SERENA.

What the Greeks named *ἀμαύρωσις*, and the Latin writers of the lower ages expressed by the barbarous word Gutta Serena, is a very severe disease, and of very difficult cure. It proceeds from various causes, of which the most common is an obstruction gradually formed in the arteries of the retina by a sily blood. For, the consequence of this obstruction is, that the rays of light which should depict the images of objects on the bottom of the eye, falling on these dilated blood-vessels, produce no effect; whence the sight is either diminished, or entirely lost, according to the degree of the obstruction. Again, this disease is sometimes owing to a palsy of the nerves of this same membrane; as it in some measure destroys their sensibility; whereby the impulse of the corpuscles of light on them is not sufficient to make them transmit objects to the brain. In fine,
I have

^c A complete system of opticks, by Robert Smith, LL. D. with an essay upon distinct and indistinct vision, by James Jurin, M. D. Cambridge, 1738. ^d See Medical essays, published at Edinburgh, vol. iii. pag. 160. and vol. iv. pag. 124.

I have observed, that this species of blindness is also occasioned by a pressure on the optick nerves, either by the extravasation of a glutinous humour, or by a hard tumour formed upon the place, where they pass from their thalami into the eyes; whereby the passage of the animal spirits to the brain is totally intercepted.

So many are the accidents incident to the eye even in one disease. Let us now consider how to preserve this organ, which has so great a share in making life useful and agreeable.

And first, we ought to know how to distinguish the several species of the Gutta Serena above-mentioned, and their good and bad symptoms.

Wherefore a gradual dilatation of the pupil is a sign of an obstruction in the blood-vessels by a fizy blood. For this dilatation is the work of nature, in order that the detriment which the sight suffers by many of the rays of light falling on the small arteries, instead of the nervous fibrillæ, may be compensated by taking in a greater number of these rays. Hence the palsy of the nerves, with which they are frequently struck at once, seldom or never occasions this dilatation. But the pressure on the optick nerve, either by an extravasated humour, or a tumour gradually encreasing, is attended with a wider pupil for the aforesaid reason.

Upon this principle it is, that the second and third species of the Gutta Serena may be deemed incurable. For what medicine can be adequate to the removal of a sudden relaxation of the nerves, or of a load of extravasated humours, or a tumour formed within the skull, which are rendered inaccessible by their very situation? Wherefore it is only the first species of this blindness that is curable. Unless there may perhaps be some faint hopes of relieving that sort, which proceeds from a palsy of the retina, by antiparalytick medicines; of which the principal are aromatics, chalybeates, and the foetid gums.

But it is time to come to the cure, which in general, consists in removing the obstruction of the vessels, and correcting the lentor of the blood. Wherefore, first of all, blood is to be drawn both from the arm and the jugular, and to be repeated according to the degree of the disease. And it will be of use to apply cupping-glasses, with deep scarifications under the occiput; in order to let out blood this way from the lateral sinuses of the brain. Then it will be necessary to give catharticks, especially such as purge gross humours. But as nothing is found more powerful than quicksilver for inciding and expelling gross and viscid humours, it will be very proper to join calomel to other catharticks; or rather to take it by itself, and a few hours after it, some gentle purgative.

And this method often succeeds, when the disease is beginning or recent; but if it be of some standing, it requires a more powerful treatment, that is, a plentiful salivation, raised by mercurials taken inwardly in small quantities, and at short intervals. For mercury, by its extraordinary weight and divisibility into extremely minute globules, penetrates into the inmost recesses of the body, scours the glands and vessels, and carries off the fordes by the most convenient outlets.

I made the first trial of this course on poor patients in the hospital, when I was a young practitioner, and afterwards on others, who thereby recovered their sight; for which I was complimented by the physicians, who till then had looked on the disease as incurable, especially, if confirmed by time. Now the motive, which determined me to try the effect of this course, was, that I had found by the laws of opticks, that certain corpuscles, floating in the aqueous humour of the eye, could not be the cause of this disease, according to the common opinion; because they must be too near the bottom of the eye to be able to depict their image there. Wherefore there was a necessity of seeking some other cause; and whether I have found the true one,

one, is entirely submitted to mathematicians. For my part, I cannot help thinking, that this invention is a remarkable instance of the great use of true mathematical knowledge towards establishing a right method of practice.

SECTION II.

OF THE CATARACT.

The Cataract, by the Greeks named *γλαύκωμα*, by the ancient Latins *suffusio*, and by the moderns *cataracta*, is an opacity of the crystalline humour, which from transparent is generally changed to a greyish colour; whereby the passage of the rays of light to the bottom of the eye is intercepted.

Physicians in all former ages, were of opinion, that this species of blindness was owing to a membrane præternaturally growing before the crystalline humour, and covering its anterior surface in the manner of a veil; and that the sight was restored by depressing this membrane with a needle. But the erroneousness of this opinion has been at length discovered and demonstrated in this century. For in the dissection of eyes, both of persons who had been afflicted with Cataracts, and had never been couched; and of others, on whom the operation had been performed with success; there was not the least appearance of a membrane, but the dryness, hardness and opacity of the crystalline humour or lens was found to be the cause of the disease.

However, I must not omit taking notice, that a real membrane has been sometimes found, though the case be very rare: an instance of which has been lately shewn me by our excellent anatomist Dr. Thomas Lawrence, in an elegant preparation of a child's eye injected by him; in which there plainly appeared a membranous expansion that covered the pupil, and had its blood-vessels filled with the injection. And hence I draw this

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* See Antoine Maitre—Jan, *Traité des maladies de l'oeil*. Troyes, 1707.
 † See *Histoire & memoires de l'academie royale des sciences*. Paris, 1708.

general inference, that although it be very certain, that in most cases of this disease, it is the crystalline humour that is removed out of its place by the operation ; yet it may sometimes happen, that the needle depresses a membrane which by some accident was grown hard and opake.

Upon the whole, the hand of a skilful surgeon is the only remedy in this disorder. But the operator ought to wait for a certain degree of ripeness of the Cataract, and give attention to other circumstances ; in order to determine the time of performing the operation with safety, and a prospect of advantage.

SECTION III.

OF THE ALBUGO.

The Albugo, or white speck in the eye, is likewise a troublesome disease, which is more or less offensive to the sight, according to the greater or lesser portion of the transparent part of the cornea affected by it. For sometimes it fixes on the exterior surface only of this membrane, sometimes on the interior ; and sometimes, in fine, it runs more or less deep into it.

It is most commonly the consequence of inflammations, by the extravasation of humours between the membranes of this tunicle ; and particularly in the small-pox, by the suppuration of pustules upon this part.

I have made use of two methods of cure for this disorder of the sight ; the one in the outward sort, the other in the inward. In the former case, I ordered the following powder.

Take of common glass any quantity. Pound it in a mortar into a very fine powder : then add an equal quantity of white sugar-candy, and levigate the mixture on a marble with great labour, till it becomes quite impalpable.

A little of this powder, put into the eye with a quill every day, gradually absterges, and wears off the spot by its inciding quality.

quality. The other method above-mentioned of removing this speck is, to order a dexterous surgeon to pare it cautiously every day with a knife; for this tunicle is composed of several lamellæ, one over another, and has thickness enough to bear paring off some of its parts. I have seen several instances of cures by the eye-powder; but the paring off the cornea has not succeeded with me above once or twice. However, it is better to try a doubtful remedy than none.

THE FORCE OF ODOURS.

I have hardly any thing of great moment to propose concerning the rest of the senses; except a few hints relating to the organ of smelling. For as daily experience convinces us of the great power of scents, both to do harm and good; I think it may be of use to give some short remarks on them.

And first, their mischievous effects in communicating contagious diseases are sufficiently manifest. For it is most certain, that the subtile effluvia, which issue from an infected body, being taken in with the breath, do infect a sound habit. Moreover, every body is sensible, at one time or other, that from this cause proceed head-achs, and sicknesses at stomach by the acquired ill-quality of the spittle. But on the other hand, nothing is more notorious than the great energy of odoriferous things in repairing our strength. And this is effected, either by the animal spirits being roused out of a state of oppression, or by being refreshed and recruited by such things as emit particles, that are friendly and agreeable to nature, applied to the nose. For effluvia of this kind are, as it were, a proper food for the animal spirits.

Now, of all the odoriferous bodies hitherto known, the most powerful are spirits and volatile salts extracted by fire from animal substances; and next to these are those animal-glands distinguished by the names of castor, musk, and civet. But there

may perhaps be just cause to admire, that these bodies do not equally agree with all constitutions. For many are wonderfully refreshed by musk and civet; whereas, we see others, who are more or less over-powered, even to a degree of sickness and fainting, by the scents of these same perfumes; and yet are refreshed and revived by castor and asa fœtida. This difference seems, in my opinion, to arise from a different habit of the nervous fluid in different persons; and nature generally points out, which of this class of bodies will be beneficial, and which hurtful to each individual. Nor have I the least doubt, but that a sense of the efficacy of these things is conveyed to the mind by the fluid of the nerves. And such is the wisdom and goodness of the supreme Creator in the construction of our frame, that he has made those things pleasant to the senses, which are proper for the preservation of life, or necessary for the propagation of the species. Nevertheless, moderation is to be constantly observed in all these things, to prevent the allurements of pleasure from hurrying us into excesses, which may prove prejudicial both to the soul and body.

C H A P. XII.

Of the G O U T.

THE Gout is most commonly a disease of persons, who have too much indulged themselves in high living; in which nature endeavours to throw the load of noxious matter out of the body upon the joints. Thus this disorder is rather to be deemed a crisis of the disease, than the disease itself: and in this view, great care and prudence are required, to facilitate nature's attempt in producing the effect. Wherefore, the pain

is by no means to be mitigated by external remedies of any kind whatsoever. For by attempting this, the gouty humour may be thrown back upon the vital organs in an instant, and the patient's life put into imminent danger; which seems to afford a remarkable proof, that this violent commotion in the body is owing to a very subtile and active fluid, and such is the nervous juice. But in case this fiery humour should happen to remove from the limb into the body, all possible means ought to be used, to make it return on the part. And this is to be done by blood-letting; the warmer catharticks, which are not violent in their operation; alexipharmicks; and above all, by epispasticks laid on the limbs, with regard always had to the place affected. For nothing is more desirable, than that the evil should fix for several days on those parts of the extremities of the body, which it has first taken possession of; because, when it once returns into the habit, it is with great difficulty driven out again: so that, perhaps, it may be justly said, that the Gout is the only cure of the Gout.

The seat of this disease is in the ligaments of the joints, the tendons of the muscles subservient to their motions, and the membranes surrounding the bones. And when the acrimonious humour has fallen on these parts, it irritates and frets them: hence arises an inflammation, and a painful tumour is formed by the oozing of the thinnest part of the juices out of the minutest ramifications of the arteries and nerves. For nature makes use of pain as an instrument; and the sharper it is, the more speedily and safely she finishes her work. Sometimes, indeed, she does it slowly, as if she neglected her duty; and in some habits of body she protracts the torture a longer time than usual, as if her intention was to divide her medicine. But when the tumour subsides, part of the extravasated humour, which could not perspire through the pores of the skin (and there is but a small portion of it, indeed, that is exhaled this way) is absorbed into the veins and lymphaticks; while the thickest part of it sticks

to the membranes: and fresh quantities of it being lodged there in every fit of the Gout, it sometimes concretes into hard masses, commonly called chalk-stones, which by degrees stuff the joints, and destroy their action.

As to the medical treatment, different methods are to be pursued in the fit, and out of it. Quiet is not only indicated, but enforced by the very incapacity to motion. In case of a fever, the diet should be the same as in acute diseases; otherwise, common food of easy digestion may be allowed. For great care must be taken of the stomach and strength. And this circumstance, which I have scarcely ever remarked in any other distemper, is here to be observed; that when the Gout has seized the stomach, this organ becomes so cold and torpid, that wine seems no stronger than water; and it requires, and easily bears the hottest liquors, such as spirits drawn from wine. Wherefore, not only generous wines are to be given in pretty large quantities, but also vinous spirits, rendered more efficacious by the infusion of snake-root, ginger, or garlick. And if these should not prove powerful enough, it will be proper to order the powders of snake-root, ginger, and long-pepper, mixed with the cordial confection, to be taken by the mouth.

It has been disputed among physicians, whether, or not, a vein may be opened, when the pain in the joint is extremely severe. Now, to settle this point, we ought never to forget, that this pain is highly necessary for tumefying the part, and therefore ought to be borne with patience. This however notwithstanding, (seeing it is certain, that excessive heat is an obstacle to the natural secretions from the blood, which are necessary for health) if the fever run very high, and especially, if it be attended with a delirium, or difficulty of breathing, blood-letting will not only lessen the pain, but likewise happily promote the issue of the humour*. Nay, it will be requisite to repeat the operation, when there appear signs of a comatose disposition.

For

* See Discourse of the Small-Pox, chap. iii.

For I have very frequently observed physicians to be too timorous with respect to this evacuation, from a notion, that it would prevent the gouty humour from being thrown upon the joints. Upon the whole, one effect of blood-letting is generally, to make the disease abandon the place where it was lodged; and the great benefit of this removal in several cases is manifest. But as for anodynes, they are not to be allowed, excepting in vomiting and loosenesses. Nor do gouty people (to say it once for all) bear catharticks well, till the paroxysm is over; and then they may be given, to carry off the remains of the morbid humour, which raised the tumour.

Of greater difficulty and moment is the question concerning the regimen, whereby a person may entirely rid his constitution of this tormenting disorder, and keep it off for the future. Upon which, the first consideration ought to be, whether that can be done with sufficient safety and advantage to the patient. For, as to elderly people, who have been accustomed for many years to returns of the disease, if the fits come on no more, their bowels are attacked instead of their joints; and besides, they are seized with such weakness in their legs and feet, that the remainder of their life is quite miserable: and of this I have seen more than one instance in persons, who had absolutely confined themselves to a milk and vegetable diet.

Therefore, if any one be desirous of trying the experiment, and running the risk of its consequences, let him remember, that he ought to be young, and not to have had above two or three fits of the Gout. Then let him obstinately abstain from wine and all other fermented liquors, and for drink, confine himself to water. Let his food be milk, and things made from it, and vegetables; besides which, he may make one meal a day on flesh of the tender sort, such as that of chickens, fowls, and rabbits, and now and then on fresh-water fish. Let him use daily exercise, but with moderation. By this course of living, I have known some live comfortably to a good old age, without
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the least attack of the Gout. Of such consequence it is to live according to nature, that is, to practise temperance. And a trial of this course of life is in a peculiar manner adviseable for those, who may expect to be punished for the irregularities of their parents, not for their own, by a hereditary Gout ; in order to prevent its seeds, sown in their blood and nervous fluid, from producing disagreeable fruits in time.

I shall close the present chapter with this admonition, that although I said above with great truth, that this disorder is rather to be deemed a crisis of the disease, than the disease itself ; yet sometimes, especially in old age, it is a very severe evil ; when the strength is so decayed, and the limbs so weakened, that bodily motion is lost, and with it a considerable share of the comforts of life. However, this, like all other calamities, is alleviated by patience. And perhaps, it may be some consolation to others, as well as it was to Sydenham, in the midst of tortures, that great monarchs, potentates, generals, admirals, philosophers, and many others like them, lived, and at length, died in the same manner ^b.

C H A P. XIII.

Of pains in the joints.

THOSE pains of the joints, which are accompanied with inflammation and tumour, have an affinity with the gout. The proper method of curing them is by bleeding, blistering the parts affected, and, unless the fever runs high, by purging. If there be no fever, or but a slight one, a mixture of equal parts of gum-guaiacum and cinnabar of antimony will prove a very

^b Tract. de Podagra. ed. 1. page 24.

very good medicine, both to open the body, and correct the acrimony of the humours. It should be given so as to procure two stools at least every day.

Of all these pains the most severe is that, which the Greeks name *ισχιας*, (and we corruptly sciatica) because it seizes the hips; and it is attended with the greater difficulty, because it is most commonly the consequence of chronical diseases, by the morbid matter being thrown on this part. This disease, when grown inveterate, weakens the thigh and leg, and makes the patient lame: and sometimes also the head of the thigh-bone slips out of the socket, and then the thigh soon wastes away.

In this disease, little is to be expected from cupping or blistering the part; for the acrid humour lies too deep fixed in the membrane surrounding the bone, to be drawn out by these means. More efficacious is the volatile epithem, or a plaister composed of Burgundy pitch, with about an eighth part of euphorbium, and a sufficient quantity of Venice turpentine.

But nothing gives so much relief, in an obstinate case especially, as a seton passed below the part affected, in order to give vent to the morbid humour. But, if this operation be thought to be too cruel and troublesome for the necessity of it, it will be of use to make an issue, with a caustick in the inside of the thigh above the knee; which must be kept open till the disorder is quite removed. Celsus^a, following the example of Hippocrates^b, advises to apply the actual cautery in three or four places upon the hip. And indeed, no remedy would be more efficacious than this, if patients could be reconciled to it; for how terrifying soever the sight of red-hot iron may appear, the pain from the application of it would be much sooner over, than that which is raised by the common causticks.

The flesh-brush ought likewise to be used several times every day, in order to facilitate the digestion and dissipation of the concreted humour; and more especially on the very hips, if practicable.

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^a Lib. iv. cap. 22.

^b Aphor. vi. 60.

practicable. But fomenting the part affected with warm water is generally prejudicial; because this brings on a relaxation of the fibres, whereby the pain is encreased.

I now pass to internal remedies, the chief of which are bleeding and purging. Of catharticks, the most efficacious are dulcified mercury six times sublimed, and the electuary of scammony; either of which must be often repeated, according to the patient's strength. And in the intermediate days of purging, the proper medicines are such as are diuretick and laxative at the same time. Of this class, I give the preference to the volatile tincture of gum-guaiacum, or the balsam of guaiacum.

C H A P. XIV.

Of the diseases of the skin.

I SHALL say nothing at present of those eruptions which happen in fevers; nor of the blotches and spots which appear on the skin in scorbutick habits; because all these are treated of in their proper places^a. But of all the diseases which infest the surface of the body, the most filthy is the leprosy. This is of two kinds, the one is named the leprosy of the Greeks, the other that of the Arabians: but I have considered them both in another book, with regard to their nature and method of cure^b.

The disease next to this in foulness, but of a very different origin, is the itch. This first appears in a reddish roughness of the skin; which is succeeded by pimples, that let out matter or a sharp ichor; and the exulceration is attended with itching, and spreads by contagion. It may justly be called an animated disease, as owing its origin to small animals. For there are certain insects, so very small as hardly to be seen without the assistance

^a Chap. of Fevers, and the Scurvy.

^b See Medica sacra, chap. ii.

ance of a microscope, which deposit their eggs in the furrows of the cuticle, as in proper nests; where, by the warmth of the place, they are hatched in a short time; and the young ones, coming to full growth, penetrate into the very cutis with their sharp heads, and gnaw and tear the fibres. Their bitings cause an intolerable itching, which brings on a necessity of scratching, whereby the part is torn, and emits a thin humour, which concretes into hard scabs. While the little worms, constantly burrowing under the cuticle, and laying their eggs in different places, spread the disease.

Hence the reason manifestly appears, why the disease is communicated by the linen, wearing-apparel, gloves, &c. which were used by infected persons. For the eggs, which had stuck to soft substances of this kind, are rubbed into the furrows of the cuticle, and are there hatched and nourished.

Now what is of greatest moment in this theory is, that the knowledge of the true cause of the disease naturally points out the cure. For neither catharticks, nor sweeteners of the blood, are of any service here; the whole management consists in external applications, in order to destroy these corroding worms; and this is easily effected. Wherefore, first, let the patient go into a warm bath, and then let the parts affected be anointed every day, either with the ointment of sulphur, or the ointment with the precipitate of mercury, which is less offensive to the olfactory organs; instead of which a liniment may be made of orange-flowers, or red roses, the mercurial, red corrosive and hog's lard pounded together; which is of a very pleasant smell, and of equal efficacy.

All that I have said on this subject may be found in the Philosophical Transactions^c. For in the year 1687, Dr. Giovanni Cosimo Bonomo, an ingenious physician, published a letter written by him in Italian to the celebrated Redi of Florence, concerning the worms of the human body; wherein he fully

handles this subject, and gives the figures of these worms and their eggs. And when I was upon my travels in Italy ten years afterwards, having got a copy of the letter, I made an abstract of it in English, and upon my return communicated it to the royal society.

C H A P. XV.

Of scrophulous diseafes.

THOSE hard swellings of the glands, which the Latins named *strumæ*, the Greeks *χοιράδες*, and we the king's evil, are very obstinate, and often perplex the physician; as they sometimes bring on a fever, and never mature kindly: and whatever way they are treated in order to open and cicatrize them, they generally break out again near the old scars. Their most common seat is in the neck, and in the arm-pits and groin, especially in children; but sometimes they appear on the thorax, and on the breasts of women. Moreover, the humour often falls on the lungs, and brings on a pulmonary consumption; and indeed, that disease is generally owing to a scrophulous cause in this and other northern countries at least. And it is a dreadful circumstance of the evil, that it is transmitted from parents to their children by way of inheritance, which it does not easily give up.

As to the cure of this stubborn disease, it is to be attempted by bleeding, purging, and such medicines as are most proper for correcting the viscidty, saltness, and acrimony of the humours. Of catharticks, the best is dulcified mercury six times sublimed, which should be joined with rhubarb for children; but to adults it may be given alone, with a gentle purging draught.

draught some hours after it. The next to this in virtue is jalap. And our purging waters are also useful, as they scour the glands, and open the body at the same time. In fine, a pill composed of mercury fix times sublimed, and precipitated sulphur of antimony, each one grain; of aloes, three or four grains, made up with the syrup of balsam, and taken every night, will be found serviceable not only in this disease, but in others arising from viscid humours.

The medicines, which correct this pravity of the blood and humours, are, for the most part, of the diuretick kind; such as burnt-sponge, the diuretick salt, and vitriolated tartar; which are the more proper, because they are somewhat laxative. To these may be added, the less compound lime-water. For my part, I have very often experienced the good effects of the following powder, taken twice a day, with three or four glasses of the aforesaid water.

Take of burnt-sponge, one scruple; of purified nitre, coralline, and white sugar, each ten grains; mix.

And if the patient happen to be emaciated, equal parts of milk may be mixt with the water. Millepedes will also be of some service upon account of their diuretick quality, especially the expressed juice thus prepared.

Take live millepedes, pound them with a little powder of nutmeg; infuse the mass in small wine; then strain off the liquor by expression, and sweeten it with honey, or sugar.

As to the patient's diet, which ought not to be neglected, let him feed on flesh of easy digestion, and fresh-water fish, especially of the shell-kind. Let him abstain from all salt meats and high seasoned things. Let him drink river-water, and that boiled; but well, or other stagnating water never, and least of all snow-water. For we observe, that the inhabitants of mountainous places, the Alps especially, are naturally afflicted with swellings of the glands of the throat:

Quis tumidum guttur miratur in Alpibus ^a?

Issues are likewise beneficial to drain off the vicious humour; and a change of climate is often attended with good effects; especially, if there be reason to apprehend the humour falling on the lungs: but the patient should be sent to a moderate climate, not subject to great vicissitudes of heat and cold.

Lastly, it is to be noted, that this disease, notwithstanding its stubbornness, sometimes entirely wears off, in young folks especially, without any medicinal assistance, by alterations in the habit of the body, which time and growth occasion: and I am of opinion, that this circumstance first gave birth to the custom of the royal-touch. For when crafty men observed, that the evil was of this nature, they easily imagined, that they would please their kings, in persuading them to make this experiment of their power, and to introduce it with solemn rites and prayers; whereby they might acquire reverence from their subjects, and convince them that they held their crowns by divine right. And it is not matter of wonder, if the princes took the bait, and sometimes believed that they were endowed with this gift from heaven; since according to the poet:

——*Nihil est, quod credere de se
Non possit, cum laudatur dīs æqua potestas* ^b.

Moreover, the world is willing to be deceived; and the experiment sometimes succeeded, though the success might probably be owing in a great measure to the force of imagination, which acts very powerfully in the cure of diseases. Hence our kings (unless when a prince of more than ordinary wisdom filled the throne) have for a long time conferred this favour on the credulous

^a Juvenal Sat. xiii. ver. 162.

^b Ibid. iv. ver. 70.

dulous multitude with great humanity. But the French boast, that their kings had received this heavenly gift long before our monarchs.

C H A P. XVI.

Of the SCURVY.

THE name of Scurvy is given by medical writers to a disease so various and different in appearance, that it does not seem to be one and the same distemper. In the northern countries it has always been common, and the nearer they are to the sea, the more severe it proves; accordingly the Danes, Norwegians, and other inhabitants of the coasts of the Baltick are vastly afflicted with it; nor do the Germans, Dutch, or our own countrymen escape its fury^a.

It begins by foul ulcers in the mouth and legs; whence it is called stomacace and sceletyrbe by Pliny, who imputes it to the bad qualities of water, and says, that the herba Britannica (which is believed to be the *hydrolapathum nigrum* of Muntingius, or great water-dock) was found to be its cure^b. But the disease was known long before Pliny's time: for Hippocrates describes it by the name of *σπλῆν μέγας*, or great spleen; and says likewise, that it arises from drinking cold, crude, turbid waters^c.

I remember to have formerly seen in St. Thomas's hospital an instance of this case in a country-fellow of the Isle of Sheppey, which place is notorious for moist, thick air, and unwholesome water.

^a See *Eugalenus de scorbuto*, and *Sennertus*, Lib. iii. part v. hift. Lib. xxv. sect. vi.

^b *Nat. See De internis affect. sect. xxxiv. and De aëribus, locis, & aquis, sect. x.*

^c

water. When the Roman army, under the command of Claudius, landed in Britain, and the troops were stationed in the above-mentioned island and places adjacent, they there contracted this disease ; and it is not improbable, that some of the natives shewed them the herb, which Pliny says was of service to them, and that the Romans gave it the name of herba Britannica from the country. For it is well known, that that emperor embarked his army for that expedition at Boulogne, which is directly opposite to Kent^d. Strabo relates a similar story of the Roman army, which Augustus sent into Arabia under the command of Ælius Gallus. For he says, that while they were at Albus Pagus, the soldiers were seized with disorders of the mouth and legs, called stomacace and sceletyrbe, which are endemick in that country, and are a sort of relaxation, proceeding from the waters and vegetables^e. Now to me it is very plain, that the unwholesome sea-air, bad diet, and worse water, rendered that climate subject to those disorders ; for Ptolemy, in his Geography, places Albus Pagus on the coast of the Sinus Arabicus or Red-Sea. But to return from this digression : the poor patient above-mentioned had an irregular, intermitting fever, with a bad habit of body ; and likewise an ill-natured ulcer in each of his legs. By the use of medicines, proper in the Scurvy, I mean bitters and diureticks, he seemed to grow better ; for one of the ulcers was by chirurgical applications entirely healed ; but while the other was under cure, a gangrene seized the part unexpectedly, which being scarified in order to check its progress, the patient died suddenly. Upon opening the abdomen, we were struck with amazement at the monstrous size of the spleen. For it weighed five pounds and a quarter ; whereas the liver weighed but four pounds and a quarter. But its bulk seemed to

^d See Suetonius in the life of Claudius, chap. xvii.

^e Στομακάκη τὸ καὶ σκελετύρβη πειρασζομένης τῆς γαλιᾶς ἐπιχωρίοις πάθεσι, τῶν μὲν περὶ τὸ γόμα, τῶν δὲ περὶ τὰ σκέλη παρὰ λυγρὴν τῆν ἐνδεδέναν, ἢ τῶν ὑδατῶν, καὶ τῶν βοτανῶν. Geograph. Lib. xvi. pag. 781. ed. Paris. 1620.

to be its only defect; for it retained its natural shape and colour, and had not the least scirrhoty or other hardness: and its inside was, as usual, of a dark livid hue, with lax fibres, and deep-coloured blood.

From the above-mentioned ulcers the breath becomes offensive, the gums are corrupted, and turn livid, and sometimes blackish; and upon pressing them lightly with the finger they emit a dusky gore. Besides, they are so lax and flabby, that they quit their hold of the teeth; and these are sometimes so loose, that they may be all pulled out with great ease. In the mean time, greenish and lived spots, like the remains of ecchymoses, appear on various parts of the body, as on the arms, buttocks, thighs, legs, and frequently all over the skin, so as to make it have the appearance of a jaundice. The patient is also tortured with severe gripings. And from this symptom it is, that the disease has obtained its name, being derived from the Saxon word *schorbock* or *schorbuck*, which signifies tearings of the belly.

Besides unwholesome waters, medical writers attribute the disease partly to salted provisions and pulse; which, as they are of difficult concoction, furnish the body with gross and improper nutriment. But they seemed not to have sufficiently attended to a more universal cause, I mean, bad air, which taken into the lungs is very prejudicial. This is particularly manifest in long voyages, in which the sailors are most severely afflicted with this distemper. Whereof we have a remarkable, and moving account, in the history of Lord Anson's expedition to the South Seas; in which that great commander lost near a third part of his men by this cruel enemy; and the calamity rose to such a high pitch, that the callus of broken bones, which had been completely formed for a long time, was found dissolved, and the fracture seemed as if it had never been consolidated.

4 B

Where-

¹ See Anson's Voyage round the world. Lond. 1748.

Wherefore, in these cases, there certainly must be a high degree of corruption of the bodily humours, and even a degree of putrefaction : and the blood becomes so foul a mixture, that whence-soever it be drawn, it has nothing of its natural red colour, but resembles a dark, muddy puddle. Now, as to the manner, in which the causes above-mentioned corrupt and putrefy the humours, it will be easily found by those who are well acquainted with the properties and laws of motion in the animal machine : which I need not dwell on in this place, because I have pretty amply treated of them in a tract before-mentioned, in which I demonstrated the usefulness of Mr. Sutton's machine for extracting foul air out of ships, and other close places^s.

With regard to the cure, it is much easier to prevent the Scurvy than to remove it ; for when it has once taken root in the body, it is very difficult to drive it out by medicines. Now its best remedy is good wholesome air, and proper diet. Wherefore, as soon as a person is taken ill, if he be at sea, he ought to alter his situation as soon as possible, and get on shore, to breathe the land air ; but if on land, he should go into the country for the benefit of purer, open air. And in both cases, what flesh he eats should be fresh and tender ; but the greatest part of his food ought to be vegetables, both such as abound in a volatile salt, as scurvy-grass, cresses, brook-lime, and the like ; and those which are of a cooling nature, as sorrel, endive, lettuce, purslain, and others of this kind. And it will often be beneficial to eat all these, or some of each sort promiscuously together. But the greatest service may be expected from subacid fruits, as lemons, oranges, and pomegranates, eaten frequently, upon account of their cooling and subastringent quality.

But I recommend to the reader the perusal of the above-mentioned voyage, which is written in a clear and elegant style, and, besides, various interesting incidents, which must give pleasure

^s Discourse on the Scurvy, annexed to Sutton's historical account of a new method for extracting the foul air out of ships, &c. Lond. 1749.

sure to all orders of men, contains many things proper for physicians to know. Nor will he perhaps repent his trouble, in turning over what I wrote on this disease in the tract, wherein I explained the usefulness of Mr. Sutton's machine. There he will find a remarkable case of a Dutch sailor on board one of the Greenland ships, who was so wasted and disabled by the Scurvy, that he was put on shore in Greenland, and abandoned to his fate: and yet by feeding on scurvy-grass (or rather grazing on it; for he had lost the use of his limbs, and crawled about on his hands and knees) he was perfectly cured, and was found the ensuing season on the island, and brought home in health and vigour.

But it is time to close this chapter; which I do, by recommending Mynsicht's elixir of vitriol, taken in cold water at proper intervals, and sometimes the styptick tincture, taken in the same manner, as very good medicines for checking hemorrhages, which are not uncommon in this disease.

C H A P. XVII.

Of the hypochondriacal disease.

THE hypochondriacal disease is an indisposition of the whole body, and not of any particular part; and yet the abdominal viscera, viz. the stomach and intestines, the liver, spleen, pancreas and mesentery, are chiefly affected in it, according to the peculiar nature of each of them. The stomach is disordered with frequent ructus and flatulencies, the signs of crudities. The liver is swelled with thick, viscid bile, obstructing its ducts. When the spleen is affected, the function of which seems to be, to convey a very fluid blood through its arteries, partly into its

own cells, and partly into the splenick vein, for the uses of the liver; this blood grows so thick as almost to stagnate in that vein, whereby this soft organ is tumefied and distended. If the pancreas be affected, the glands, which secrete the pancreatick juice, grow scirrhus in some degree, and perform their office too sparingly: hence the bile, which mixes with it in the intestines, is not sufficiently diluted; and the chyle being too thick passes with difficulty through the lacteals, and in some measure stagnates in its passage. When the omentum is disordered in this disease, the thin subtil oil, which is collected in its cellules, in order to be conveyed to the liver, and there to be mixed with the blood brought thither from the spleen, passes in lesser quantities than usual; whereby the blood in the vena portarum is not rendered thin and fluid enough. In fine, the consequence of the mesentery being affected is, that through the obstruction of its glands, and subsequent deficiency of the lymph, which they ought to secrete for the dilution of the chyle, this liquor becomes too thick, and less proper for nutrition. Hence it manifestly appears, that in this disease the blood and humours grow thick and sluggish, and are rendered unfit for their respective motions, and the uses of life.

This disease, so various in appearance, is chiefly owing to two causes, rest of body, and agitations of mind: by the former, the humours are rendered too sluggish in their motions; and by the latter, the blood at one time almost stagnates, and at another, is driven on with excessive vehemence; and health must suffer in both cases.

This theory plainly points out the cure, which consists in purging off and correcting the humours. Yet the disease does not require strong catharticks; it is much safer to trust to the milder sort, such especially as attenuate the humours, and work by stool and urine at the same time. Of this kind are the deobstruent pills, aloeticks, blended with saponaceous medicines, rhubarb, Glauber's salt, and the like.

The

The lentor and thickness of the humours are most conveniently removed by chalybeates, bitters, and aromatics, especially in tinctures. And natural chalybeate waters are the most efficacious of all steel medicines.

In fine, all sorts of bodily exercise are necessary; and in particular, it will be of great service to play at bowls or tennis, to toss the arms briskly to and fro with lead weights grasped in the hands; but nothing is better than riding daily on horseback.

I finish with a short story which may seem ridiculous, but is true, and shews the whimsicalness, if I may use the expression, of this disease. A certain fellow of a college, by too much indulging a sedentary life, was so severely afflicted with this disorder, that he was at length obliged to take to his bed; and his hypochondriacism gradually rose to that pitch, that he declared himself at the point of death. In that fit, he ordered his passing knell to be rung in a church not far from his chambers; which was accordingly done; but in so bungling a manner in his opinion, (for he had been a famous ringer in his younger days) that in a violent passion he jumped out of bed, ran to the church, chid the sexton, and told him he would shew him the true way of ringing. Whereupon he grasped the rope, and fell to work with such vehemence, that he soon wrought himself into a muck sweat; then returned to bed in order to die contented. But he was disappointed, for the exercise restored him to life and health. Thus, as Hippocrates formerly observed^a, contraries are the remedies of contraries.

^a Τὰ ἐναντία τῶν ἐναντίων εἰς ἐν ἴσμεται. De flatibus. sect. iii.

C H A P. XVIII.

Of the affections of the mind.

THE affections of the mind, commonly called passions, when vehement and immoderate, may be justly ranked among diseases ; because they disorder the body various ways. The fact is indisputable ; but in order to account for the manner in which it is brought about, it is necessary to have a clear and distinct notion of the nature of the soul, and of the law of its union with the body ; a point of knowledge, to which, in my opinion, we shall never attain in this life. For such is the condition of our existence, that though we have it in our power to exert the faculties of our mind and our bodily strength with surprising promptitude ; yet we are grossly ignorant of the manner and principle of all our actions, the knowledge of which seems quite unnecessary for leading a good and happy life.

However, we can easily perceive the effects of the commotions of the mind on our corporeal frame ; nor is it any ways difficult to discern the alterations, which they occasion in the blood and humours. For some of them retard, others accelerate the motion of the circulating fluid ; while others again act as checks and spurs alternately. Thus grief and fear slacken its pace ; anger, indignation, and intemperate lust, drive it on a full gallop : and a combination of these and the like commotions produces precipitate and sudden vicissitudes of slowness and quickness. And it may not be amiss to observe, that inordinate affections, dwelling long on the mind, frequently become tedious diseases according to their respective natures. So anxiety, despair, and grief cause melancholy ; and anger ends in fury and madness. But the passions do not act with equal force on all individuals : their effect varies according to the diversity of constitutions

stitutions both of mind and body; and even in the same individual, the disturbances, which they raise, are different at different times. So thoroughly incomprehensible is the construction of our fabrick.

But there is another very wonderful circumstance, which I do not find recorded by any other medical writer but Aretæus ^a. For it is not only true, as he observes, that the affections of the mind bring on bodily diseases; but these diseases likewise in their turn engender passions, and such sometimes as seem quite contrary to the nature of the disease. And this he exemplifies in a dropsy, which, though it be a most pernicious disease, yet inspires the sick with courage and patience; not from any alacrity, or good hopes, as happens to those who are in prosperity, but from the very nature of the disease. A fact, says he, which we can only admire, without being able to discover its cause.

But all those things are performed by the intervention of the animal spirits, which make that great engine of the blood's motion, the heart, contract with lesser or greater force. Wherefore the pulse discovers those alterations even in their very beginning.

But before I come to the medical treatment of the disorders of the mind, it may not be improper to take notice, that the omnipotent Creator has given us these natural commotions for very wise ends; which seem to be, that thereby we may be urged with a kind of impetuosity to shun evil, and embrace good. Wherefore the passions are not bad in themselves; it is their excess that becomes vicious, when they rise to such an extravagant pitch as not to be governed by the dictates of reason.

Now, to assuage these swelling surges of the soul is the business of philosophy. But, alas! in this point all the precepts of the very Stoicks commonly prove ineffectual; for the followers of this sect frequently speak mighty things, but live not up to their doctrine:

Naturam

^a De causis & signis diuturnorum morborum, Lib. ii. cap. 1.

Naturam expellas furcâ licet, usque recurret.

Nature expell'd by force resumes her course.

However, we ought to use our best endeavours; for the more difficult the conflict, the more glorious will be the victory. It will possibly be said by some, that a physician should confine himself to the cure of bodily distempers, and leave these moral points to be controverted and settled by philosophers. Now, whatever force this advice may have in other cases, this before us seems to me of such moment, that I beg to be indulged in the liberty I take, of interspersing this medical work with some few incentives to virtue, which I have learned in their schools.

First then, we all have a natural propensity to pleasures; but these are of two very different sorts, the sensual and the mental. Sensual pleasures engross the greatest part of mankind; while those few only, quos æquus amavit Jupiter, are taken with the beauties of the mental. And the reason why so many run after pleasures of the first sort seems to be; because they hardly ever allow themselves an opportunity of tasting the sweets of an upright conscience, or of feeling that joy, which arises to a good man from the moderation of his irregular desires; and being entirely devoted to the gratification of their sensual appetites, they never give the least attention to the real charms of virtue. Wherefore whosoever desires to enjoy this solid happiness, ought to inure himself by degrees to the love of virtue, and ever carefully to avoid adding fuel to the fire of his passions.

Apposite to these sentiments is that saying, which Cicero puts into the mouth of Cato, as by him received from the great Archytas of Tarentum; that nature never afflicted mankind with a more capital plague, than bodily pleasure; the eager desires of which spur on to enjoyment with ungovernable rashness^b. And the rest of what that great philosopher has written on this subject,

^b De senectute, cap. xii.

subject, must delight the mind of every wise man in the perusal. Wherefore, virtue's exclamation in Silius Italicus, is very just :

*Quippe nec ira deum tantum, nec tela, nec hostes ;
Quantum sola nocet, animis illapsa voluptas* °.

Pleasure, by gliding on the minds of men,
More mischiefs hast thou wrought than hostile arms,
Than wrath of gods.

But as the due government of the passions strengthens the mind, so temperance in diet renders the body less exposed to these turbulent motions. And this rule holds good, not only in those, who are naturally of a hot constitution, but even in those, who curb their appetites ; because it keeps them in a state of tranquillity.

And this is the way in general, to resist these evils, or at least to diminish their effects. But when they have taken deep root in the body, each of them requires its own proper remedies. In those commotions, which check the course of the vital humours, spurs are necessary ; but curbs, when they gallop too fast. The strong-smelling gums, castor, volatile salts, and spirits extracted from animals, and things of this kind, are very convenient stimuli. Blood-letting, keeping the body open, nitre, and all other coolers restrain the impetuosity of the blood. But it is of the utmost consequence to frequent the company, and follow the advice of persons of fortitude and wisdom ; for in every stage and state of life great is the power of example, whereby we insensibly learn to give ear to reason, and govern our passions ; which, unless brought into intire subjection, will become our tyrants.

But as for those, who would have us to be entirely devoid of passions, and to suppress all the affections of the mind, as if they

were so many evils; they certainly have a strong notion of the wisdom and goodness of the almighty Creator, who has inserted, and, as it were, interwoven them into our frame for excellent purposes; for they are not only beneficial to individuals upon many occasions, as I have already said; but even necessary for keeping up society and connections between mankind.

C H A P. XIX.

Of the diseases of women.

ON the diseases of women there seems to be the less necessity of saying much, because a number of authors have taken vast pains in their description and cure. Yet, to avoid the censure of neglecting that lovely sex, I will briefly touch on a few points relating to their ailments; beginning by those, which are often the consequences of a single life. Of these the most frequent is

S E C T I O N I.

THE SUPPRESSION OF THE MENSTRUAL DISCHARGES.

The common cause of the stoppage of the menstrual discharges is the blood's lentor; whereby this fluid becomes incapable of forcing the sphincters of the ducts, destined by nature for this evacuation. For it is not from the bursted arteries of the uterus, which is the common opinion, that the blood issues every month, but from vessels peculiarly appropriated to this office. And this lentor, or thickness of the blood, changes the
lively.

THE EXCESS OF THE MENSTRUAL DISCHARGES. 563
lively colour of the face into a greenish pale and wan complexion.

The proper medicines in this distemper are those, which are capable of encreasing the blood's circulation, and attenuating the viscid humours; and such are all bitters, joined with aromatics, as also many preparations of steel. But to these ought to be premised blood-letting, and catharticks, blended with calomel. The tinctura sacra is also an excellent medicine.

But of all the most powerful emmenagogues, I have found so singular a virtue in black hellebore, that I hardly remember it ever failed answering my expectations. My way of ordering it is, a tea-spoonful of tincture of black hellebore in a glass of warm water, to be taken twice a day. And I have observed this remarkable circumstance; that whenever, either from a bad conformation of the parts, or any other cause, this medicine had not the desired effect, the blood was forced out through some other passages; which is a manifest proof of the great power of this medicine in spurring the blood forward.

SECTION II.

THE EXCESS OF THE MENSTRUAL DISCHARGES.

But likewise the menstrual discharges frequently run to excess. In that case, the flux is to be restrained: which, after letting blood, is effected both by those medicines, which condense and inspissate the blood; and by those, which allay its heat. Of the first sort, the principal are such as participate of vitriol or alum; especially the tincture of roses; or a powder, composed of alum three parts, and dragon's blood one part, melted together. But the heat of the blood, and its consequence, the flux, is more powerfully checked by the Peruvian bark, than by any other medicines whatsoever.

SECTION III.

THE FLUOR ALBUS.

The Fluor Albus is a discharge of a whitish, gleety matter by the natural parts of the sex. This humour issues sometimes from the vessels of the uterus, and sometimes from the glands of the vagina. In the former case, this discharge is suppressed during the time of the menstrual courses; in the latter, it subsists with them, and continues even in the time of pregnancy.

In both species of the disease, the principal intention ought to be directed towards mending the habit of body, from some fault in which they derive their origin: but when the seat of the distemper is in the vagina, it will moreover require topical applications.

Wherefore, generally speaking, it will be proper to begin the cure by giving a vomit, especially with Ipecacoanha wine. Frequent purging is indicated chiefly with rhubarb; which may be taken either in substance, with the addition of aromatics, and in some cases, of a little calomel now and then; or in the tincture of rhubarb in wine. And the laxity of the fibres requires astringents, particularly such as have steel in their composition.

As to external or topical remedies, which, I have said, are necessary, when the vagina is the seat of the disease; we ought carefully to avoid applying all such as are powerful repellers of the peccant humour: for those only are serviceable, which deterge, and heal the little ulcers of that membrane. For my part, I have often, with great success, ordered the patient to inject a small quantity of Bates's aqua aluminosa, or of the camphorated vitriolick water, with a little Egyptian honey added to either, into the vagina through a proper syringe, at repeated times. And it will be of some service to fumigate the vagina now and then with a powder, made of equal parts of frankincense, mastich, amber, and cinnabar of antimony, thrown on burning coals.

SECTION IV.

THE HYSTERICAL DISEASE.

There is no disease so vexatious to women as that called hysterical. It is common to maids, wives, and widows ; and although it may not be attended with great danger, yet it is frequently very terrifying : and moreover, it sometimes deprives them of their senses as effectually, as if they had been seized with an epileptick fit.

When a woman has fallen into a hysterical fit, blood-letting will be of use, if she has strength to bear it ; if not, cupping-glasses are to be applied to her groins and hips. But if she continues long in it, it will be proper to put the snuff of a candle, or some other thing of a fœtid smell to her nostrils, in order to rouse her. In the mean time, her thighs and legs ought to be rubbed.

When she is recovered from the fit, proper means must be used to prevent a relapse. If she be liable to obstructions, and not regular, the menstrual discharges are to be promoted. The strong-smelling gums and steel medicines are very serviceable : and it is beneficial to use exercise. But the disturbances of the mind generally require proper remedies.

In fine, Hippocrates after prescribing castor, and many other medicines, wisely says, that a woman's best remedy is to marry, and bear children ^a.

^a "Αγιστον δὲ ἐν γαστρὶ ἔχειν τὴν δὲ παρθένον πείθειν συνοικεῖν ἀνδρί. De morbis mulierum, Lib. ii, sect. 19.

S E C T I O N V.

D I F F I C U L T B I R T H.

Humanity prompts us to give what assistance we can, besides the manual operation, to the sex in hard labour. For although provident nature has taken such good care for the propagation of the human species, that the labour-pains are seldom attended with much danger; yet it sometimes happens, that the birth is very difficult and tedious. And this difficulty proceeds from many different causes, with which those who are truly skilful in the obstetrical art are not unacquainted, and therefore they manage accordingly. But there is one case, in which they are often at a loss what to do; and that is, when the lying-in woman is long teized with false pains, resembling those of the colick. When this happens, it is proper to give a grain or two of opium; whereby those pains, which rather hinder than promote the delivery, are appeased; and then nature thus relieved does her work effectually. It is likewise of some moment in this case to know, that the opiate relaxes and opens the uterine parts, as it does all others that are in a state of constriction or tension.

C H A P. XX.

O F V E N E R E A L D I S E A S E S.

THE venereal infection, that bitter scourge of unlawful embraces, would have proved the reproach of physicians; had not quicksilver been happily found to be its antidote.

The

The nature, history, and progress of the disease have been so amply and elegantly described by the learned Astruc ^a, that nothing more can be required on that head. But as to the manner, in which this ponderous fluid operates in the body, I think I have clearly explained it in another place ^b, with some necessary cautions annexed. Wherefore the only thing now remaining is, to make a few remarks on a disorder or two, which are the consequences, either of the disease itself, or of a bad cure.

And first, that discharge of a mucous humour, commonly called a gleet, which sometimes succeeds a virulent gonorrhœa, is very troublesome and obstinate. It proceeds both from the vesiculæ feminales and the prostate gland, by the erosion of the orifices of their ducts from the acrimony of the morbid humour; and is most commonly the result of an ill-judged method of curing the gonorrhœa with violent catharticks, which destroy the natural tone of the fibres.

Nothing is more common among practitioners in this case, than to administer balsamicks, with a view of strengthening the parts; but generally without success. It has been my practice for many years past to order the following tincture; and as I found it very efficacious, I have recommended it to a number of physicians and surgeons.

Take of rhubarb three drachms; of gum guaiacum, a drachm and a half; of shell-lake, a drachm; of cantharides bruised, two drachms; of cochineal, half a drachm: infuse these ingredients in a pint and half of rectified spirits of wine, and strain off.

Of this let the patient take from thirty to fifty drops (that is, as much as can be given without danger of bringing on a strangury) morning and night, in a glass of warm water.

A hectic fever is now and then the consequence of a long salivation. In this case a decoction of the woods of guaiacum
and

^a De morbis venereis. Paris, 1740.

^b Essays on Poisons, 1747. Essay iv.

OF DISEASES WHICH COME UPON,
and saffraſas, and the roots of china and ſarſaparilla, with a little liquorice, and coriander ſeeds, is to be drank plentifully, mixed with milk. And the patient ſhould continue this courſe, till he has recovered ſtrength and fleſh.

Laſtly, it may not be amiſs to admoniſh, that the moſt proper time for ordering a ſalivation is, when either pocky eruptions have for ſome time appeared on the body, or ulcers, eſpecially in the mouth and throat; and the bones are not yet become carious. For when they are actually foul, there is reaſon to apprehend, that their lamellæ may be broke aſunder by the ponderoſity of the mercurial globules. Wherefore, it is ſafer to protract the cure by a more ſparing uſe of this medicine, than to hurry it on by a contrary practice.

C H A P. XXI.

Of diſeaſes which come upon, or are changed into, others.

IT is of great moment, both for the benefit of the patient, and the honour of the phyſician, to know what diſeaſes come upon, or are changed into, others. Wherefore I will briefly mention ſome of theſe.

Authors indeed have raiſed great diſputes on the cauſes of theſe changes: but they are certainly different according to the nature of the reſpective diſeaſes. For ſometimes the conſent, and a certain affinity of the affected parts with others not yet affected, cauſe the diſeaſe to paſs from the former to the latter. More frequently the vicinity of the parts makes the evil to ſpread from one to another. But moſt commonly ſuch is the nature of the diſeaſe, that it terminates in another, either by way of
crisis,

crisis, or through the foulness of the habit. Out of a number of examples, which I could produce, I shall select some few.

Through the consent of the head and stomach, when this is loaded with phlegm, that is seized with giddiness; and on the other hand, the repletion or other injury of the brain is attended with a sickness at stomach. Through a similar affinity between the liver and intestines, colick pains are often succeeded by a jaundice; and a jaundice sometimes occasions a colick, by pouring sharp bile into the guts. And such is the connection of the uterus with many other parts, that Hippocrates pronounced this organ to be the cause of all diseases in women^a. Now these parts are chiefly the head, lungs, and stomach; and the instruments of this sympathy are the animal spirits, which, being hurried by the passions, either convey the disorders of the womb to the rest of the body, or communicate the distempers of the body to that organ.

The vicinity of the parts, which I have alledged as another cause of the succession of diseases, takes place chiefly in inflammations, by the translation of the humour to the adjacent part. Thus a pleurisy becomes a peripneumony; the iliack passion supervenes a strangury; the disorders of the kidneys spread to the loins; and the pains in the loins are communicated to the kidneys.

In fine, the third cause which I have assigned for the super-vention or transition of diseases, is the very nature of these diseases; which as it is various, so it produces its effect various ways. The gout sometimes turns into the colick, and the colick into the gout. Varicose swellings of the veins, supervening pains in the joints, indicate the distemper going off. An apoplexy is succeeded by a palsy; and this paralytick seizure of the nerves, whether of the whole body, or of some particular part, is the crisis of the apoplectick fit. But if from the para-

^a De morbis mulierum, Lib. ii.

lytick limbs the disorder returns to the head, death is generally the physician. Difficulty of breathing, of long continuance, gives rise to a dropfy in the breast as well as in the belly. An anasarca affords great reason to apprehend an ascites: and melancholy of long standing is frequently succeeded by an epilepsy, which is hardly within the power of art to remove.

Hippocrates collected a great number of observations to this purpose, and upon them built the divine art of prognostick in diseases, to which I refer my readers. Wherefore I quit the subject with this admonition, that although the causes, which I have enumerated, often exert their power singly; yet it commonly happens, that more than one of them concur in effecting those successions and transitions of diseases.

C O N C L U S I O N.

Of the regimen of life.

I HOPE it will not be thought inconsistent with the scope of this treatise on the diseases of the human body, to subjoin, by way of Conclusion, some short rules for the management of persons in health through the different stages of life. Although indeed this task seems to be rendered almost superfluous by the precepts delivered by Celsus^a: which, whosoever will observe, with due regard to the difference of climates, and manner of living now and in the time of that wise author; most certainly, to use his own words, will not in good health squander the resources of infirmities^b.

For

^a Lib. i. cap. 1, 2, 3.
consumet.

^b In secunda valetudine adversæ præsidia non

For such is the natural constitution of the body of man, that it can easily bear some changes and irregularities without much injury: had it been otherwise, we should be almost constantly put out of order by every slight cause. This advantage arises from those wonderful communications of the inward parts, whereby, when one part is affected, another comes immediately to its relief. Thus, when the body is too full and overloaded, nature causes evacuations through some of the outlets. And for this reason it is, that diseases from inanition are generally more dangerous than from repletion; because we can more expeditiously diminish than encrease the juices of the body. Upon the same account also, though temperance be beneficial to all men, the antient physicians advised persons in good health, and their own masters, to indulge a little now and then, by eating and drinking more plentifully than usual. But of the two, intemperance in drinking is safer than in eating. And if a person has committed excess in the latter, cold water drank upon a full stomach will help digestion; to which it will be of service to add lemon-juice, or elixir of vitriol, if he has eaten high-seasoned things, rich sauces, &c. Then let him sit up for some little time, and afterwards sleep. But if a man happens to be obliged to fast, he ought to avoid all laborious work. From satiety it is not proper to pass directly to sharp hunger, nor from hunger to satiety: neither will it be safe to indulge absolute rest immediately after excessive labour, nor suddenly fall to hard work after long idleness. In a word therefore, all changes in the way of living should be made by degrees.

It is also beneficial to vary the scenes of life; to be sometimes in the country, sometimes in town; to go to sea, to hunt, to be at rest now and then, but more frequently to use exercise: because inaction renders the body weak and listless, and labour strengthens it. But a mean is to be observed in all these things, and too much fatigue to be avoided; for frequent and violent exercise over-powers the natural strength, and wastes the body;

but moderate exercise ought always to be used before meals. Now of all kinds of exercise riding on horseback is the most convenient ; or, if the person be too weak to bear it, riding in a coach, or at least in a litter : next follow fencing, playing at ball, running, walking. But it is one of the inconveniencies of old age, that there is seldom sufficient strength for using bodily exercise, though it be extremely requisite for health. Wherefore frictions with the flesh-brush are necessary at this time of life, which should be performed by the person himself, if possible ; if not, by his servants.

Sleep is the sweet soother of cares, and restorer of strength ; as it repairs and replaces the wastes that are made by the labours and exercises of the day. But excessive sleep has its inconveniencies ; for it blunts the senses, and renders them less fit for the duties of life. The proper time for sleep is the night, when darkness and silence invite and bring it on : day-sleep is less refreshing. Which rule if it be proper for the multitude to observe ; much more is the observance of it necessary for persons addicted to literary studies, whose minds and bodies are more susceptible of injuries.

The softer and milder kinds of aliment are proper for children, and for youths the stronger. Old people ought to lessen the quantity of their food, and encrease that of their drink. But yet some allowance is to be made for custom, especially in the colder climates, like ours : for as in these the appetite is keener, so is the digestion better performed.

Physicians are agreed, that copulation,
When age adult and high-brac'd nerves invite,
Should neither be immoderately desir'd,
Nor dreaded to excess. The good old man
Is by his tame frigidity admonish'd,
Not to engage in the dull drudgery,

Mistaken

Mistaken for enchanting scenes of pleasure ;
Left thus he snap his feeble thread of life.
But what more base, more noxious to the body,
Than by the power of fancy to excite
Such lewd ideas of an absent object,
As rouse the organs, form'd for nobler ends,
To rush into th' embraces of a phantom,
And do the deed of personal enjoyment !

In fine, this truth ought to be deeply imprinted on every mind,
that this, and indeed all other,

Voluptates commendat rarior usus.

Pleasures are heighten'd by a sparing use.

For my part, after mature consideration, I am long since come to this way of thinking. That although pleasures, riches, power, and other things, which are called the gifts of fortune, seem to be dealt out to mankind with too much partiality ; yet, if we take in the whole compass of the matter, we shall find a greater degree of equality of those things, which constitute real happiness, than is generally imagined. People of low condition, for the most part enjoy the common advantages of life more commodiously than those of the highest rank. Wholesome food is acquired by moderate labour ; which likewise mends the appetite and digestion : hence sound sleep, uninterrupted by gnawing cares, refreshes the wearied limbs ; a flock of healthy children fill the cottage ; the sons grow up robust, and execute the father's task, making his hoary locks sit comfortable on him. How vastly inferior to these blessings are the vain delicacies of most persons of affluent fortunes, which are closely attended with real evils. In order to get down their food, their stomachs require high fauces, which heat and corrupt the blood,
and

and render the body obnoxious to distempers: the debauches of the day disturb their rest by night: and in punishment for their vices, their sons, the great ornament and support of families, contract diseases in their mother's womb; with which they are afflicted through the whole course of a languid life, which seldom reaches to old age. They are likewise frequently racked with anxieties for obtaining honours and splendid titles, so as to be despoiled of the comforts, which they might reap from their plentiful possessions, by the vain desire of new acquisitions. Wherefore

——— *Horum*

Semper ego optarim pauperrimus esse bonorum^c.

I always wish to be extremely poor
In wealth like this.

But there is one great inconvenience more attending high living, that by over-loading the body, the faculties of the soul are clogged, and the passions set all on fire; whereas on the contrary, the slender and homely diet of the poor and laborious, neither oppresses the strength of body, nor supplies the vices with fuel. Therefore, unless prudence be a constant attendant on opulence,

Vivitur exiguo melius.

'Tis better living on a slender fortune.

Nor is nature to be deemed an unjust step-mother, but a most provident and beneficent parent.

Upon the whole, it behoves a wise man in every stage of life,

——— *Servare modum, finemque tenere,
Naturamque sequi^d.*

——— *To*

^c Horat. Satyr. i. ver. 78.

^d Lucan. Lib. ii. ver. 381.

———To hold the golden mean,
To keep the end in view, and follow nature.

But whosoever forms a right judgment of human nature, will certainly find, that as some men are vastly superior to others in the endowments of the mind, and yet, a sad reflection ! even the best minds are blended with some degree of depravity ; so the most healthy bodies are frequently afflicted with great infirmities : and these being the seeds of death, ought to put us in mind of the shortness of this life, and of the propriety of this expression of Lucretius :

Vitaque mancupio nulli datur, omnibus usu^c ;

None have a right to life, all to its use.

And likewise that there is no absurdity in this saying of Hippocrates :

Ὅλος ἄνθρωπος ἐκ γενετῆς νόσός ἐστι^f.

The whole man from his birth is a disease.

^c Lib. iii. ver. 984.

^f Epist. ad Damaget.

M E D I C A

S A C R A.

P R E F A C E.

My declining years having in a great measure released me from those medical fatigues, in which, for the publick good, (at least as I hope) I have been employed about fifty years, I have determined to pass the short remains of life in such a sort of leisure, as may prove neither disagreeable to myself, nor useless to others. For good men are of opinion, that we must give an account even of our idle hours, and therefore thought it necessary, that they should be always well spent.

Having from my earliest childhood entertained a strong passion for learning, after I had chosen the art of medicine for my profession, I still never intermitted my literary studies; to which I had recourse from time to time, as to refreshments strengthening me in my daily labours, and charming my cares. Thus, among other subjects, I frequently read the holy scriptures, as becomes a christian; and next to those things which regard eternal life, and the doctrine of morality, I usually gave particular attention to the histories of diseases, and the various ailments therein recorded; comparing those with what I had learnt either from

medical writers or my own experience. And this I did the more willingly, because I had remarked that divines, through an unacquaintance with medicinal knowledge, frequently differed widely in their sentiments; especially on the subject of dæmoniacks cured by the power of our saviour Jesus Christ. For it is the opinion of many, that these were really possessed with devils, and that his divine virtue shone forth in nothing more conspicuous than in expelling them. I am very far from having the least intention to undermine the foundations of the christian doctrine, or to endeavour, by a perverse interpretation of the sacred oracles, to despoil the Son of God of his divinity, which he has demonstrated by so many and great works performed contrary to the laws of nature. Truth stands no more in need of the patronage of error, than does a natural good complexion of paint. And it is certain, that the opinion which has been prevalent for many ages, of the power granted to devils, of torturing human bodies and minds, has been several ways made subservient to the subtle designs of crafty men, to the very great detriment and shame of the christian religion.

What sensible man can avoid justly deriding those solemn ceremonies, practised by the Roman priests, in exorcising, as they are fond of terming it, dæmoniacks: while proper persons (hired and) taught to counterfeit certain gestures and fits of fury, such as are believed to be caused by evil spirits, pretend that they are freed from devils, and restored to their senses by holy water,
and

and certain prayers, as by enchantment. But these juggling tricks, how grossly soever they may impose on the eyes and minds of the ignorant multitude, not only scandalize, but also do a real injury to, men of greater penetration. For such, seeing into the cheat, often rush headlong into impiety; and viewing all sacred things in the same light, after they have learnt

Religionibus atque minis obsistere vatum^a:

they advance farther, and by an abominable effort, endeavour thoroughly to root out of their minds all sense and fear of the supreme deity. In which proceeding they act as if a person doubted of the existence of the Indies, because travellers relate many falsehoods and fictions concerning them. Hence it comes to pass, that, in countries too much given up to superstition, very many atheists are to be met with even among the learned, whom their learning and knowledge ought to secure from these errors. Therefore to be free from this folly, is the principal part of wisdom; next to which, is not to corrupt truth with fictitious opinions.

And indeed it is frequently to me a matter of wonder, why our spiritual guides so strenuously insist on exhibiting devils on the stage, in order to make the divinity of Christ triumph over these infernal enemies. Is Christ's divine power less manifested by the cure of the most grievous diseases, performed in an instant at
his

^a Lucret. Lib. i. ver. 110.

his command ; than by the expulsion of evil spirits out of the bodies of men ? Certainly all the wonderful things done by him for the good of mankind, such as restoring sight to the blind, firmness and flexibility to relaxed or contracted nerves, calling the dead to life, changing the properties of the elements, and others of the same kind, are testimonies of the omnipotence of the Creator of the world, and demonstrate the presence of God ; who alone commands all nature, and at his pleasure changes and inverts the order of things established by himself. Wherefore it cannot be doubted, that He, who has performed these things, had the devils subject to him, that they might not obstruct his gracious resolution of revealing the will of his Father to men, and correcting their depraved morals.

But to resume the subject of dæmoniacks, the opinion, which I propose in this treatise, is not purely my own, but also of several other persons, before me, eminent for piety and learning. And indeed among our own countrymen, it was in the last century defended in an excellent dissertation, by that treasure of sacred knowledge, the reverend Joseph Mead. Wherefore as I have the honour to be of the same family with him, and am the son of Matthew Mead, a very able divine, I always thought I might lay some claim to these studies, by a kind of hereditary right.

I am not insensible of the difficulty of removing vulgar errors, especially those which relate to religion. For every body knows the power of education, in im-

printing on the mind notions, which are hard to be effaced even in adult age. Children in the dark fear ghosts and hobgoblins; and hence often quake with the same fear through the whole course of their lives. Why then do we admire, if we can hardly unlearn, and clear our minds of, some false notions, even when we are advancing to old age? Nor will this be deemed indeed a matter of little importance by him, who considers the serious evils, into which mankind are often led, by things that to some may appear trifling, as being nothing more than bugbears of children and women. My soul is seized with horror on recollecting, how many millions of innocent persons have been condemned to the flames in various nations, since the birth of Christ, upon the bare suspicion of witchcraft: while the very judges were perhaps either blinded by vain prejudices, or dreaded the incensed populace, if they acquitted those, whom the mob had previously adjudged guilty. Who would believe that any man in his right senses could boast, as a matter of merit, that he had capitally condemned about nine hundred persons for witchcraft, in the space of fifteen years, in the sole dutchy of Lorraine^b? And yet from many histories, which he relates of those who suffered, it manifestly appears, that every individual of these criminals, had no compacts with devils, as they themselves imagined, but were really mad, so as openly to confess that they had done such feats as are impossible in the nature of things. But so it happens, that error generally

^b See Nic. Remigii Dæmonolatreia.

generally begets superstition, and superstition cruelty. Wherefore I most heartily rejoice, that I have lived to see all our laws relating to witchcraft entirely abolished: whereas foreign states still retain this barbarous cruelty, and with various degrees of obstinacy in proportion to their ignorance of natural causes. And it is but too true, that the doctrine of dæmons is so understood by the vulgar, as if the devil was to be esteemed a sort of deity; or at least, that, laying the fear of him aside, no divine worship can well subsist; although the apostle has expressly said; For this purpose the Son of God was manifested, that he might destroy the works of the devil^c.

And here it may not be improper, once for all, to inform the reader, that I have generally made use of Sebastian Castalio's version of the bible, because, upon collating it in many places, I found it to be not only excellent Latin, but also very accurate, and particularly well adapted to the sense and meaning of the words in the Hebrew and Greek.

Nor can I refrain from declaring, that I have not writ these essays for the profane or vulgar; but for those only who are well versed, or at least initiated in theological or medical studies: and for this reason I chose to publish it in Latin; which language has for many ages past been made use of by learned men; in order to communicate to each other, whatsoever might seem to them either new, or expressed in a different manner from the common notions.

Where-

^c John Ep. i. Chap. iii. ver. 8.

Wherefore if any person should intend to publish an English version of this book, I give him this timely notice, that he will do it, not only against my will; but likewise in direct opposition to that equitable law, whereby every man is allowed to dispose of his own property according to his pleasure^d.

But to bring this preface to a conclusion; it is manifest that the christian religion requires of all its members in a most especial manner, to practice every act of humanity and benevolence towards each other. Wherefore the utmost care ought to be taken, that this beneficent disposition of mind be not corrupted by any means whatsoever: and nothing contributes more towards bringing on this corruption, than opinions derogatory from the divine goodness. Upon this account, as such is the misfortune of our times, that it is not only allowed, but even by many deemed a commendable action, to oppugn, and by every method to invalidate, the doctrine and authority of the christian religion; no interpretations of the histories of miracles ought to be looked upon as out of season, provided they appear neither improbable, nor repugnant to the nature of the facts related.

In fine, it was not my intention to treat of every disease mentioned in holy writ; but to confine myself

^d This declaration seems to have been intended only to prevent any surreptitious translation of this performance from appearing, seeing most of the works of our learned author have heretofore been greatly disgraced by attempts of that kind. Nevertheless the publick may be assured, that Dr. Mead not only approved, but inspected what is now offered to them.

self more particularly to those, the nature of which is generally but little known, or at least to such as I had some peculiar medicine for, or method of cure, to offer to the publick ; and to perform this task, in the same order, in which they occur in those sacred writings : excepting only Job's disease, to which I have given the first place, on account of the great antiquity of that book. The Saviour of the world, in order to make his divine power manifest to mankind, cured many other diseases, both of the body and mind, besides those which I have mentioned in this work : the nature and causes of all which diseases, whosoever would intend to enquire into, must of necessity compile a body of physick, which was not my present design. But if providence protract my life, I am not without hopes of laying more of my thoughts on this subject before the publick, for the honour which I bear to my profession, unless

Frigidus obstiterit circum præcordia sanguis.

In the mean time, whatever be the fate of these essays with my readers, I shall rest satisfied from a consciousness of the rectitude of my intention, in having thus employed some of my hours of leisure.

A
C O M M E N T A R Y
O N T H E
D I S E A S E S

Mentioned in Scripture.

C H A P. I.

The disease of J O B.

JO B's disease is rendered remarkable by some uncommon circumstances and consequences ; such as the dignity of the man, the sudden change of his condition, his extraordinary adversity, his incredible patience under them, his restoration to a much happier state than he had ever before enjoyed, and lastly the singular nature of the illness with which he was seized.

His habitation was in the land of Uz, which, according to the learned Frederick Spanheim ^a, was situated in the northern part of Arabia deserta, towards the Euphrates and Mesopotamia. He was a very illustrious man, the most opulent of all the orientals, very happy in sons and daughters, of a most upright life and exemplary piety. Now it is related that God, in order to

4 F 2

try

^a Histor. Jobi, Cap. iv.

try his integrity and constancy, permitted Satan to afflict him by all means which he could devise, except the taking away of his life. “ In pursuance of this permission, Satan brought the
 “ most dreadful calamities on him; for all his oxen and asses
 “ were driven away by the Sabeans; his sheep and servants
 “ were consumed by fire from heaven; his camels were carried
 “ off; his sons and daughters were crushed to death by the
 “ falling in of the house upon them in a violent storm of wind;
 “ and soon after he himself was afflicted with scabs and foul
 “ ulcers all over his body; so that he sat down among the
 “ ashes, and scraped himself with a potsherd.” Thus from a very rich man he became extremely poor, and from the height of prosperity he sunk into the depth of misery. And yet all these evils did not give the least shock to his firmness of mind, nor to his piety towards God^b: wherefore the Lord, moved by his prayers, put an end to all his calamities; gave him twice as much wealth as he had lost, and made him more prosperous than he had ever been before^c.

Now the book of Job may justly be esteemed the most antient of all books, of which we have any certain account: for some are of opinion that it was written in the times of the patriarchs; many others, that it was composed about the days of Moses, and even by Moses himself; and there are but few who think it posterior to him^d. For my part, I embrace the learned Lightfoot’s opinion, that it was composed by Elihu, one of Job’s companions, chiefly because he therein speaks of himself as of the writer of this history^e, and if so, it will appear to be older than the days of Moses. However this be, it is most certain that this book carries with it manifest tokens of very great antiquity; the most material of which seem to be these. In it there is not the least mention made of the departure of the Israelites
 out

^b See Job Chap. i. and ii.

^c The same Chap. xiii.

^d See Span-

heim’s learned dissertation on this subject in the book above quoted, Chap. viii and

ix. ^e His works, tom. i. pag. 24.

out of Egypt, of Moses, or the Mosaic law. After the manner of the patriarchs, Job, as the head of his family, offered sacrifices in his own private house, for the sins of his children^f. When he declares his integrity he scarcely mentions any other idolatry, but that most ancient one, the worship of the sun and moon^g, which we know to be very old, and to have first obtained among the neighbouring Chaldeans, and Phœnicians. In fine his own age, protracted far beyond the life of man in Moses's time, is a proof of its antiquity, for he lived a hundred and forty years after an end had been put to his calamities; so that it is reasonable to believe that he lived above two hundred years in all. For that he was aged, when his misfortunes crowded on him, may be hence inferred, that, although his three friends are stiled old men^h, yet in his disputes with them, he does not seem to honour them for their age, as Elihu does. To avoid prolixity, I join with Spanheim in opinion, that Job's time coincides with the bondage of the children of Israel in Egypt, so as to be neither posterior to their quitting that country, nor anterior to their entering it.

But there subsists a dispute of a different nature between very grave authors, and that is, whether this narrative be a fable or a true history: if I were allowed to interpose my opinion, I would say, that it is not a parable invented by ὑποτύπωσις, but a dramatick poem composed upon a true history; and perhaps with this design, that from the example of this illustrious and upright, yet afflicted and most miserable man, the people of Israel might learn to bear with patience, all those evils and hardships, which they were daily suffering in their Egyptian captivity. That this book is metrical, as well as David's Psalms, the Proverbs, Ecclesiastes, and Solomon's Song, is generally allowed: and the persons of the drama are God, Satan, Job and his wife, his three friends, and Elihu. Wherefore it is, says Grotius,

^f Job Chap. i. ver. 5.
Chap. xxxii. ver. 6.

^g The same, Chap. xxxi. ver. 26, 27.

^h Job

Grotius, a real fact, but poetically handledⁱ. Poetry was certainly a very antient manner of writing, and poets were wont to embellish true histories in their own way, as we see in the most antient among the Greeks and Romans. And among the Hebrews likewise, long after the time abovementioned, Ezekiel comprised the history of the departure out of Egypt in a dramatick poem, upon which account he is called by Clemens Alexandrinus, the poet of Judaick tragedies^k. Nor indeed, in my opinion, can there be found, in this kind of writing, any thing more admirable, and better adapted to move the passions than this piece; whether we regard the sublimity and elegance of style, the description of natural things, or in fine, the propriety of the characters ascribed to all the persons concerned in it; all which circumstances are of the greatest moment in a dramatick performance.

————— *Quo propius stes*
Te capiet magis.

————— The nearer you behold,
The more it strikes you.

Before I close this chapter, it may not be improper to offer my conjecture concerning the disease of this illustrious man. But previous to this, it is proper to remark, that it is not Job himself, or his friends, but the author of the book that attributes his calamities to Satan; for this author's intention seems to be, to shew, by a striking example, that the world is governed by the providence of Almighty God, and as the holy angels, whose ministry God makes use of in distributing his bountiful gifts, punctually execute all his commands; so Satan himself with his agents are under the power of God, and cannot inflict any evils

ⁱ Est ergo res vere gesta, sed poeticè tractata. In locum. ^k 'Ο τῶν Ἰουδαίων τραγωδιῶν ποιητής.
^k Stromat. book i. pag. 414, of the Oxford Edit. 1715.

evils on mankind without the divine permission. Thus, when the Sons of God (angels) came and presented themselves before the Lord, it is said that Satan came also among them. Now the word *astare* to present one's self, as Moses Maimonides¹ observes, signifies to be prepared to receive Jehovah's commands, but Satan came of his own accord and mixed with them without any summons.

Now as to the disease, it is plain that it was cuticular, and as it is certain that the bodies of the Hebrews were very liable to foul ulcers of the skin from time immemorial; upon which account it is, that learned men are of opinion that they were forbid the eating of swine's flesh (which, as it affords a gross nourishment, and not easily perspirable, is very improper food in such constitutions) wherefore by how much hotter the countries were which they inhabited, such as are the deserts of Arabia, the more severely these disorders raged. And authors of other nations, who despised and envied the Jews, say that it was upon this account that they were driven out of Egypt; lest the leprosy, a disease common among them, should spread over the country^m. But there is another much worse disease, so frequent in Egypt, that it is said to be endemial thereⁿ, though it may also be engendered in this hot country, I mean the Elephantiasis. Perhaps it was this, which is nearly of the same nature with the leprosy, that had affected the body of our righteous man: but on this subject we shall treat more largely in the subsequent chapter.

¹ More Nevochim, Part. iii. Chap. xxii.
C. 2. & Tacit. Hist. Lib. v. ab initio.

^m Justin. Hist. Lib. xxxviii.

ⁿ Lucret. Lib. vi. ver. 1112.

*Est Elephas morbus, qui propter flumina Nili.
Gignitur Ægypto in media.*

C H A P. II.

The LEPROSY.

A MOST severe disease, to which the bodies of the Jews were very subject, was the Leprosy. Its signs recorded in the holy scriptures are chiefly these. Pimples arose in the skin; the hair was turned white; the plague (or sore) in sight was deeper than the skin, when the disease had been of long standing; a white tumour appeared in the skin, in which there was quick flesh; the foul eruptions gained ground daily, and at length covered the whole surface of the body. And the evil is said to infect, not only the human body, but also the cloaths and garments, nay (what may seem strange) utensils made of skins or furs, and even the very walls of the houses. Wherefore there are precepts laid down for cleansing these also, as well as the lepers.

Medical authors are of different opinions concerning the contagion of this disease. And whereas neither the Arabian nor Greek physicians, who have treated largely of the Leprosy, have given the least hint of this extraordinary force of it, whereby it may infect cloaths and walls of houses; the Rabbin doctors dispute, whether that which seized the Jews, was not entirely different from the common Leprosy; and they all affirm, that there never appeared in the world, a Leprosy of cloaths and houses, except only in Judea, and among the sole people of Israel.

For my part, I shall now freely propose, what I think most probable on the subject. One kind of contagion is more subtil than another; for there is a sort, which is taken into the body by the very breath; such as I have elsewhere said to exist in the plague, small-pox, and other malignant fevers. But there is another sort, which infects by contact alone; either internal, as the venom of the venereal disease; or external, as that of the
itch,

itch, which is conveyed into the body by rubbing against cloaths, whether woollen or linnen. Wherefore the Leprosy, which is a species of the itch, may pass into a sound man in this last manner; perhaps also by cohabitation; as Fracastorius has observed, that a consumption is contagious, and is contracted by living with a phthical person, by the gliding of the corrupted and putrefied juices of the sick into the lungs of the sound man^a. And Aretæus is of the same opinion with regard to the Elephantiasis, a disease nearly allied to the Leprosy: for he gives this caution, “That it is not less dangerous to converse and live with
 “ persons affected with this distemper, than with those infected
 “ with the plague; because the contagion is communicated by
 “ the inspired^b air.”

But here occurs a considerable difficulty. For Moses says,
 “ If in the Leprosy there be observed a white tumour in the
 “ skin, and it have turned the hair white in it, and there be
 “ quick flesh within the tumour; it is an old Leprosy in the
 “ skin of his flesh. But if the Leprosy spread broad in the
 “ skin, and cover the whole skin of the diseased from his head
 “ even to his feet, the person shall be pronounced ‘ clean.” But the difficulty contained in this passage will vanish, if we suppose, as it manifestly appears to me, that it points out two different species of the disease; the one in which the eroded skin was ulcerated, so that the quick flesh appeared underneath; the other, which spread on the surface of the skin only in the form of rough scales. And from this difference it happened, that the former species was, and the latter was not, contagious. For these scales, being dry and light like bran, do not penetrate into the skin; whereas the purulent matter issuing from the ulcers infects the surface of the body. But concerning the differences of cuticular diseases, I heartily recommend to the reader’s perusal,

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fal,

^a De morbis contagiosis. Lib. ii. Cap. ix.

^b De causis diuturnorum

morborum, & de curationibus eorundem. Lib. ii. Cap. xiii.

^c Levit.

Chap. xiii. ver. 10, &c.

sal, what Johannes Manardus, equally valuable for his medical knowledge, and the purity of his Latin, has written upon the subject ^d.

There is no time, in which this disease was not known; but it was always more severe in Syria and Egypt, as they are hotter countries, than in Greece and other parts of Europe; and it is even at this day frequent in those regions. For I have been assured by travellers, that there are two hospitals for the leprous alone in Damascus. And there is a fountain at Edeffa, in which great numbers of people affected with this cuticular foulness wash daily, as was the antient custom.

Moreover we read the principal signs, which occur in the description of the Mosaic Leprosy, excepting only the infection of the cloaths and houses (of which by and by) recorded by the Greek physicians. Hippocrates calls himself the λεύκη or white Leprosy Φοινικίη νόσος the Phœnician disease^e. For that the word φοινικὴ ought to be read Φοινικίη, appears manifestly from Galen in his Explicatio linguarum Hippocratis; where he says that φοινικίη νόσος is a disease which is frequent in Phœnicia and other eastern regions^f. In the foregoing chapter I said that the Leprosy (Leuce) and the Elephantiasis, were diseases of great affinity^g: in confirmation of which notion the same Galen observes, that the one sometimes changes into the other^h. Now these two distempers are no where better described than by Celsus, who lived about the time of Augustus Cæsar, and having collected the works of the principal Greek writers in physick and surgery, digested them into order, and turned them into elegant Latin with great judgment. Thus he describes the leprous diseases, “ There are three species of the Vitiligo. It is named ἄλφος, “ when it is of a white colour, with some degree of roughness, “ and is not continuous, but appears as if some little drops were “ dispersed

^d Epist. Medicinal. Lib. vii. Epist. ii.

^e Prorrhetic. Lib. ii. sub finem.

^f Ἡ κατὰ φοινικην, καὶ κατὰ τὰ ἄλλα ἀναλογικὰ μέρη πλεονάζουσα.

^g Pag. 591.

^h De

simpl. medicam. facult. Lib. xi.

“ dispersed here and there : sometimes it spreads wider, but
 “ with certain intermissions or discontinuities. The μέλας dif-
 “ fers from this in colour, because it is black, and like a sha-
 “ dow, but in other circumstances they agree. The λεύκη has
 “ some similitude with the ἄλφος, but it has more of the white,
 “ and runs in deeper : and in it the hairs are white, and like
 “ down. All these spread themselves, but in some persons
 “ quicker, in others slower. The Alphos and Melas come on,
 “ and go off some people at different times ; but the Leuce does
 “ not easily quit the patient, whom it has seized ⁱ. But in the
 “ Elephantiasis, says the same author, the whole body is so af-
 “ fected, that the very bones may be said to be injured. The
 “ surface of the body has a number of spots and tumours on
 “ it ; and their redness is by degrees changed into a dusky or
 “ blackish colour. The surface of the skin is unequally thick
 “ and thin, hard and soft ; and is scaly and rough : the body
 “ is emaciated ; the mouth, legs and feet swell. When the
 “ disease is inveterate, the nails on the fingers and toes are hid-
 “ den by the swelling ^k.” And the accounts left us by the Ara-
 bian physicians, agree with these descriptions. Avicenna, the
 chief of them, says that the Leprosy is a sort of universal cancer
 of the whole body ^l. Wherefore it plainly appears from all that
 has been said, that the Syrian Leprosy did not differ in nature,
 but in degree only, from the Grecian, which was there called
 λεύκη ; and that this same disease had an affinity with the Ele-
 phantiasis, sometimes among the Greeks, but very much among
 the Arabs. For the climate and manner of living, very much
 aggravates all cuticular diseases.

Now with regard to the infection of the cloaths, it has been
 found by most certain experiments, not only in the plague, and
 some other malignant eruptive fevers, as the small-pox and
 measles, but even in the common itch ; that the infection, once

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received

ⁱ De medicina. Lib. v. Cap. xxviii. sect. 19.

^k Lib. iii. Cap. xxv.

^l Canon. Lib. iv. Fen. 3. Tract. 3. Cap. i.

received into all sorts of furs and skins, woollen, linnen, and silk, remains a long time in them, and thence passes into human bodies. Wherefore it is easy to conceive, that the leprous miasinata might pass from such materials into the bodies of those, who either wore or handled them, and, like seeds sown, produce the disease peculiar to them. For it is well known, that the surface of the body, let it appear ever so soft and smooth, is not only full of pores, but also of little furrows, and therefore is a proper nest for receiving and cherishing the minute, but very active, particles exhaling from infected bodies. But I have treated this subject in a more extensive manner in my Discourse on the Plague^m. And these seeds of contagion are soon mixed with an acrid and salt humour, derived from the blood; which as it naturally ought, partly to have turned into nutriment, and partly to have perspired through the skin, it now lodges, and corrodes the little scales of the cuticle: and these becoming dry and white, sometimes even as white as snow, are separated from the skin, and fall off like bran. Now, although this disease is very uncommon in our colder climate; yet I have seen one remarkable case of it, in a countryman, whose whole body was so miserably seized by it, that his skin was shining as if covered with snow: and as the scurfaceous scales were daily rubbed off, the flesh appeared quick or raw underneath. This wretch had constantly lived in a swampy place, and was obliged to support himself with bad diet and foul water.

But it is much more difficult to account for the infection of the houses. For it seems hardly possible in nature, that the leprous spots should grow and spread on dry walls, made of solid materials. But upon a serious consideration of the different substances employed in building the walls of houses, such as stones, lime, bituminous earth, hair of animals, and other such things mixed together; I thought it probable, that they may by a kind of
of

of fermentation, produce those hollow greenish or reddish strokes, in sight lower than the wall (or within the surface *) which, as they in some measure resembled the leprous scabs on the human body, were named the Leprosy in a house. For bodies of different natures, very easily effervesce upon being blended together. Wherefore we may reasonably suppose that this moisture or mouldiness, gradually coming forth, and spreading on the walls, might prove very prejudicial to the inhabitants, by its stinking and unwholesome smell, without having recourse to any contagious quality in it. And somewhat analogous to this is pretty frequently observable in our own houses; where, when the walls are plaistered with bad mortar, the calcarious and nitrosc salts sweat out upon their surface, of a colour almost as white as snow. The power of inspecting their houses was invested in the priests; who, when they observed this foulness, gave orders first to have the walls of the house scraped all around; and afterwards, if it continued to break out, to pull down the house, and carry the materials out of the city into an unclean place.

I am well aware, that all this is related, as if God himself had struck the house with this plague. But it is well known, that that way of speaking is not uncommon in the Jewish history; as in unexpected evils and dreadful calamities, which are sometimes said to be done by the hand of God; though they may be produced by natural causes. Nor can I be easily induced to believe, with some divines, that God, who commanded his people to be always free from every sort of uncleanness, would vouchsafe to work a miracle, in order to inflict this most filthy punishment on any person. Thus much is indubitable, that the precepts of the Mosaic law were constituted particularly, to avert the people from idolatry and false religion, and at the same time to keep them clear of all uncleanness *. To this

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end

* Levit. Chap. xiv. ver. 37.
Cap. xxxiii. & xlvi.

• Mos. Maimonid. More Navochim, Part. iii.

end conspired the prohibition of eating blood, carrion, or animals that died spontaneously, swines flesh, and that of several other creatures". For all these meats yield a gross nutriment, which is improper and prejudicial in diseases of the skin.

But in order to close these theological researches with somewhat medical, I am convinced from experience, that there is not a better medicine known against this filthy disease, than the tincture of cantharides of the London Dispensatory. Its remarkable virtue in this case, is owing to the diuretick quality of these flies. For there is a great harmony between the kidneys and glands of the skin, so that the humours brought on the latter, easily find a way through the former, and are carried off by urine: and on the other hand, when the kidneys have failed in the performance of their functions, an urinous humour sometimes perspires through the cuticular pores. But such catharticks are to be interposed at proper intervals, as are most proper for evacuating thick and acrid humours.

C H A P. III.

The Disease of king SAUL.

WHEN "king Saul was abandoned by the Spirit of
 " God, and an evil spirit from the Lord troubled him;
 " his courtiers persuaded him to command his servants to seek
 " out somebody that was a good player on the harp, who
 " might sooth or compose him by his musick, when the evil
 " spirit from God was upon him." Which when Saul had done,
 by sending messengers for David; " whenever it happened that
 " Saul was seized with that evil spirit, David took his harp,
 and

^p Levit. Chap. xi. & xvii.

“ and played on it ; and thus Saul was refreshed, and became composed, and the evil spirit departed from him ^a.”

Now to me it appears manifest, that this king's disease was a true madness, and of the melancholick or atrabilious kind, as the antient physicians called it. And the fits returned on him at uncertain periods, as is frequently the case in this sort of disease. Nor could the cause of that disorder be a secret, seeing he had been lately deprived of his kingdom by God's express command. Likewise the remedy applied, to wit, playing on the harp, was an extremely proper one. For physicians have long since taught us, that symphonies, cymbals, and noises, were of service towards dissipating melancholick thoughts ^b; the power of which we have accounted for in another place upon geometrical principles ^c. Hence also it more plainly appears, that the disorder was owing to natural causes; for otherwise how could the musick of a harp drive it away? Counsel and prudence in a man was, in the Hebrew language, usually stiled the Spirit of God; and a person deprived of these qualities, was said to be troubled with an evil spirit, that is, to be mad.

I am not ignorant that the Jews, by a manner of expression familiar among them, are wont to describe diseases of this kind, to the power of evil angels, as ministers of God; and that even at this day, some very learned men defend the same notion. But for my part, if I may be allowed to declare my thoughts with freedom, I cannot think it right to have recourse to the divine wrath for diseases, which can be proved to have natural causes; unless it be expressly declared, that they were sent down directly from heaven. For if they fall on us in punishment of our sins, the intention of the supreme lawgiver would be frustrated, unless a sure rule was given, whereby his vengeance might be distinguished from common events; in as much as the innocent may be equal sharers in such calamities with the guilty. Moreover,

^a See Samuel, or Kings, Book i. Chap. xvi.
Cap. xviii.

^b See Cels. Lib. iii.

^c Mechanical account of Poisons, Essay ii. Ed. iv.

over it seems reasonable to believe, that evils inflicted by the omnipotent Judge, must be either incurable, or curable by himself alone; that the connection of his power with his equity, may the more brightly shine forth. By such a criterion, are miraculous works distinguished from the operations of nature. For it would be impiety to suppose, that the almighty Creator of heaven and earth intended, that his works should be performed in vain. Wherefore it is worthy of our observation, that great care is always taken in the sacred histories, to make the divine power in such cases, appear most manifest to all. Thus when the Lord had infected Miriam (or Mary) with a leprosy, for a sin committed by her, and consented, on the supplication of Moses, to make her whole; it was not done till seven days afterward ^d. Gehazi's leprosy remained in him and his progeny for ever ^e. King Azariah was smote with the leprosy, for not having demolished the high places; and he was a leper unto the day of his death ^f. Ananias and his wife were struck dead suddenly by the miraculous power of St. Peter ^g. Elymas the forcerer, was struck blind for a season by St. Paul, for his frauds and wickedness ^h. Therefore since threats and plain indications of diseases, inflicted in an uncommon manner, are always manifestly declared; whensoever these are wanting, why may we not say, that the event was by no means supernatural? And I desire, once for all, that this sentiment may hold good with regard to several other calamities.

^d Numbers, Chap. xii. ver. 14.
ver. 27.

^e Kings, Book ii. (al. iv.) Chap. v.
^f The same, Chap. xv. ver. 5.

^g Acts, Chap. v.

^h The same, Chap. xiii. ver. 11.

C H A P. IV.

The disease of king JEHORAM.

OF king Jehoram it is related, that, “ for his wicked life,
 “ the Lord smote him in his bowels with an incurable
 “ disease, so that he voided his intestines daily for the space of
 “ two years, and then died of the violence of the distemper ^a.”
 Two impious kings are recorded to have had the same end,
 Antiochus Epiphanes, and Agrippa ; of whom it was said :
Εἰς τί τὰ σπλάγχνα τοῖς ἐσπλαγχνιζομένοις ^b. Of what avail are
 bowels to those who have no bowels ?

Now this distemper seems to me to be no other than a severe
 dysentery. For in this the intestines are ulcerated, and blood
 flows from the eroded vessels, together with some excrement,
 which is always liquid, and slimy matter ; and sometimes also
 some fleshy strings come away, so that the very intestines may
 seem to be ejected.

C H A P. V.

The disease of king HEZEKIAH.

“ **W**HEN Hezekiah lay sick of a mortal disease, and the
 “ prophet Isaiah went and declared to him, by God’s
 “ express command, that he should die and not recover ; the
 “ Lord, moved by his prayer, commanded Isaiah to return,
 4 H “ and

^a Chronicles, Book ii. Chap. xxi. ver. 18.
 on this place.

^b See the notes of Grotius

“ and tell him, that he would cure him in three days. Where-
 “ upon Ifaiah ordered a mass of figs to be taken, and laid it on
 “ the boil; whereby he recovered.”

Now to me it seems extremely probable, that this king's disease was a fever, which terminated in an abscess: for in cases of this kind, those things are always proper, which promote supuration; especially digestive and resolving cataplasms; and dried figs are excellent for this intention. Thus, the Omnipotent, who could remove this distemper by his word alone, chose to do it by the effect of natural remedies. And here we have an useful lesson given us in adversities, not to neglect the use of those things, which the bountiful Creator has bestowed on us, and at the same time to add our fervent prayers, that he would be graciously pleased to prosper our endeavours.

C H A P. VI.

The disease of Old-age.

OLD-AGE itself is a disease, as the poet has properly expressed it^b. Wherefore as I have frequently read with pleasure, the very elegant description of it, given by Solomon the wisest of kings; I think it will not be foreign to my design, to attempt an explanation and illustration thereof. For it contains some things not easy to be understood, because the eloquent preacher thought proper to express all the circumstances allegorically. But first I will lay the discourse itself before my readers, which runs thus:

“ Remember thy Creator in the days of thy youth, before
 “ the evil times come, and the years draw nigh, in which,
 “ thou

^a 2 Kings, Chap. xx.

^b Terent. Phorm. Act. iv. Scen. i. ver. 9.

“ thou shalt say, I find no pleasure : before the sun, and the
 “ light, and the moon, and the stars be darkened, and the
 “ clouds return after rain ; when the keepers of the house
 “ shall tremble, and the soldiers shall give way, and the dimi-
 “ nished grinders shall cease ; and those that look out through
 “ holes shall be darkened ; and the doors shall be shut out-
 “ wardly, with a low sound of the mill, and they shall rise up
 “ at the voice of the bird ; and all the daughters of musick
 “ shall be of no avail ; also when they shall be afraid of high
 “ places, and stumblings in the way ; and the almond-tree shall
 “ flower, and the cicadæ shall come together ; and the appe-
 “ tite shall be lost, man departing to his eternal habitation,
 “ and the mourners going about in the street : before the sil-
 “ ver chain be broken asunder, and the golden ewer be dashed
 “ in pieces ; and the pitcher be broken at the fountain head ;
 “ and the chariot be dashed in pieces at the pit ; and the dust
 “ return to the earth, such as it had been ; and the Spirit re-
 “ turn to God, who gave it .”

The recital of evils (and infirmities) begins from the aberrations of the mind. “ The sun, says Solomon, and the light,
 “ and the moon, and the stars are darkened.” Perceptions of the mind are less lively in old men ; the ideas and images of things are confounded, and the memory decays : whence the intellectual faculties must necessarily lose their strength or power by degrees. Wisdom and understanding are frequently called light in the sacred scriptures^a ; and privation of reason, darkness and blindness^c. Cicero likewise says very justly, that reason is as it were, the light and splendor of life^d. Hence God is stiled the father of lights^e. Thus the virtues of the mind decaying, may be compared to the luminaries of the world overcast. I am conscious that this exposition is contrary to that of

4 H 2

a number

^a Ecclesiastes, Chap. xii. ver. 1—7. translated from Castalio's Latin version.

^b Job Chap. xviii. ver. 5, 6, 7. ^c Matthew Chap. vi. ver. 23. John Ep. i.

Chap. ii. ver. 11.

^d Academ. iv. 8.

^e James, Epist. Chap. i. ver. 17.

a number of learned interpreters, who take this obscuration of the lights in the genuine sense of the words, and think that the failing of the sight is here to be understood. But I am surprized, how they happened not to take notice, that every thing in this discourse, even to the most minute circumstances, is expressed in words bearing a figurative sense. For whereas, in describing the infirmities of Old-age, the injuries of the operations of the mind, as the most grievous of all, were not to be pretermitted; so these could not be more clearly expressed, than by the obscuration of the cœlestial luminous bodies, which rule our orb, and cause the vicissitudes of times and seasons. Moreover it is particularly to be observed here, that the author mentions the defects of sight lower down, and most certainly he would have avoided repeating the same thing.

But he goes on, and adds, what well agrees with the foregoing explanation. “The clouds return after rain.” That is, cares and troubles crowd on each other, and daily oppress aged folks. As in moist climates, and those liable to storms, even when the clouds seem to be exhausted, others soon follow, and the rains become almost perpetual. And these inconveniencies are felt the more sensibly, in proportion to the debilitation of the powers of the mind, whereby they are rendered less able now, than formerly, either to bear, or get the better of their oppressions.

But from the mind our royal author now passes to the body. “The keepers of the house, says he, shall tremble, and the soldiers shall give way, and the diminished grinders shall cease.” The limbs, and firmest parts of the body, are damaged by age: the hands and knees grow weak, through the relaxation of the nerves. Hence those are rendered incapable of defending us against injuries, and of performing innumerable other good offices, for which they were originally intended; and these becoming unequal to the weight they were wont to sustain, lose their active suppleness, and fail in bending. Likewise the double
teeth

teeth or grinders, either drop out, or rot away; so as now to be too few remaining to comminute solid food. In the translation of the Hebrew word, which I have here rendered by double teeth or grinders, I followed Arias Montanus, who, in my opinion, has translated it right. For it is in this passage used by the author in the plural number; who afterwards employs it in the singular, but in a quite different sense, when he treats of the sense of tasting; as I shall shew anon, when I come to that passage. For, that Solomon's intention in this place was, to describe those defects of the senses, which generally steal on Old-age, I have not the least doubt.

Wherefore now proceeding to them, he begins by the sight. "Those, says he, that look through holes shall be darkened." By which words it is manifest, that he points out the failing of the eyes, which most people, far advanced in years, feel by sad experience.

Next follows the taste, which he thus describes: "The doors shall be shut outwardly, with a low sound of the mill." As old people, through diminution of appetite, open their mouths seldomer than formerly; so for want of teeth to comminute their food, they do it with less noise. Now this last inconvenience seems to be meant and expressed very elegantly by the words a low sound of the mill: for by the word mill, which in the Hebrew is used in the singular number, the grinding of the food may very well be meant; and this grinding, as it is not done by the assistance of the teeth, which they have lost, but by that of the gums, is performed with less noise.

Sleep is the sweet soother of our labours, and the restorer of our exhausted strength. But the loss of appetite, and disgust to our food, generally robs us of this comfort. Hence subjoining this evil of Old-age to the foregoing, he says: "he shall rise up at the voice of the bird;" that is, the old man is awaked at the cock's first crowing. Wherefore his sleep is short and interrupted, though his weakness would require longer rest.

But he returns to the senses, among which he gives the third place to hearing; for receiving the benefits of which the Creator gave us the use of ears. Now this is frequently diminished, and sometimes entirely taken away in Old-age; which the royal author seems to indicate in the following words: "The daughters of musick shall be of no avail." For thus he thought proper to express the ears, to which at this time of life, not only the pleasure of harmonious sounds is sought in vain; but, what is much more disagreeable, the words in conversation are not easily understood: whereby the enjoyment, and one of the greatest conveniencies of life, are gradually lost. Hence in the Jewish history, Barzillai, at eighty years of age, complains that he could no longer hear the voice of the singing men and singing women^h.

These defects of the organs of hearing, are immediately followed by those of the sense of feeling. Now the touch, as Cicero says, is uniformly spread over the whole body; that we may feel all strokes and appulses of thingsⁱ. Wherefore this sense, besides its other uses, contributes vastly to the safety of the body, and the removal of many evils, to which it is perpetually exposed. And this the sagacious author seems to have principally in view, when he says: "They shall be afraid of high places, and stumblings in the way." For as old folks are unsure of foot, even in a plain smooth way, by reason of the weakness of their limbs; so when they come to a rugged uneven road, through the dulness of this sense, they do not soon enough perceive the depressions or elevations of the ground, whereby they run the hazard of stumbling and hurting their feet. Therefore they are not unjustly represented as being afraid.

The only one that remains of the senses is that of smelling, the diminution of which in old men, he describes with equal elegance and brevity in this manner: "the almond-tree shall flower."

^h Samuel, (al. Kings) ii. Chap. xix. ver. 35.

ⁱ Nat. Deor. ii. 56.

“ flower.” By which words he seems to mean, that old people, as if they lived in a perpetual winter, no longer perceive the agreeable odours exhaling from plants and flowers in the spring and summer seasons. That this tree flowers in winter, we learn from Pliny, who in treating of it says: The almond-tree flowers the first of all trees, in the month of January^k. I am not to learn, that these words are by most interpreters understood as relating to grey hairs, which being generally a sure token of old age, they would have us believe, are denoted by the white flowers of the almond-tree. But then, who can imagine, that this wise author, after having indicated the defects of four of the senses, by clear and distinct marks, would designedly pass over the fifth in silence? Besides, white hairs are by no means to be esteemed a sure and indubitable token of Old-age; since there are not a few to be found, who turn grey in the middle stage of life, before their bodily strength is any ways impaired. Moreover, what they say of the flowers of the almond-tree, does not seem to agree with the things they mean by them: for they are not, strictly speaking, white, but of a purplish cast. Thus far concerning the senses; let us proceed to the remaining part.

The scrotal rupture is a disease common to persons far advanced in years; whether it be formed by the intestine or omentum slipping down into the scrotum, or proceed from a humour distending that part. In either case the part is tumefied. This pernicious disease the preacher thought proper to compare to a grasshopper. “ The grasshopper, says he, shall be a burthen, “ *Onci erit locusta.*” For thus the Hebrew phrase is more literally translated, than by convenient *cicada*; the *cicada* shall come together, as the learned Castalio has rendered it. Indeed the Vulgate version has, *impinguabitur locusta*, the grasshopper shall be fatted. The Septuagint *Παχυνθή η ἀχρίς*. The grasshopper shall be fatted. The Arabick version, turned into Latin, *pinguescet locusta*, the grasshopper shall grow fat. But our English translation, the grasshopper shall be a burden. It is well known,

^k Lib. xvi. sect. 42.

known that the Hebrew language is always modest, and that the sacred writers, in expressing such things as belong to the genital members, abstain from indecent and obscene words, for fear of offending chaste ears, and therefore borrow similitudes from any other things at discretion. Which is particularly observable in the Canticum Canticorum, or Solomon's Song, written by our author. Now the grasshopper, or locust, is an odd-shaped animal, made up chiefly of belly; and therefore, especially when full of eggs, may be said to bear some resemblance to a scrotum, swollen by a rupture.

These parts being thus affected, the wise author adds, "the appetite shall be lost;" wherein he does not attend so much to the appetite for victuals, as for those other things, which are sought after in the vigour of life. For as the author of the Art of Love has rightly said: *Turpe senilis amor*¹.

That old people are crushed to death by so great a heap of evils and infirmities, and depart to their eternal habitation, to the grief of their friends, can be no matter of wonder. But in the remaining part of the discourse we are admonished, that their miseries in this life are not confined within these bounds, but that sometimes there is still an accession of others.

For loss of strength in Old-age does not terminate at the limbs, or extremities of the body; the spine of the back also loses considerably of its firmness, by the daily diminution of power in its muscles and ligaments: hence an old man can seldom stand upright, but stoops his body towards the earth, which is shortly to cover it. This part is likened to a silver chain, which is said to be broken asunder. For the vertebræ, of which it is composed, may be looked upon as the rings or links, and they give way outward by the bending of the body. Moreover the medulla oblongata, which passes through them, is of a silver or whitish colour.

These

¹ Ovid. Amorum, lib. i. Eclog. ix. ver. 4.

These points, which we have hitherto handled, are very difficult of explanation. But the three inconveniencies, which close the discourse, are true ænigma's, and require an Oedipus to solve them. And as such an one, in my opinion, has not appeared hitherto, I will use my endeavours to do it. “The golden ewer, says he, is dashed in pieces: the pitcher is broken at the fountain-head; and the chariot is dashed in pieces at the pit.”

Old men are troubled with defluxions from the head to the nose, mouth and lungs; which are compared to water rushing out of a broken bottle or ewer. And the ewer is said to be of gold, to express the dignity of the head.

Nor does phlegm flow from the head alone; but other parts also pour forth their juices too abundantly or irregularly. For the ferocities, which are secreted by the kidneys (whose cavity is even at this day named pelvis by Anatomists) runs into the bladder; which, by reason of the relaxation of its sphincter, as if the pitcher were broken at the fountain-head, is not able to retain its contents a sufficient time. Hence an incontinence or dribbling of urine is continually troublesome.

Now, the evils hitherto enumerated lodge in particular parts; but the last calamity, both in this discourse, as well as in old people, is that the whole body is afflicted. The very course of the blood is interrupted; hence wretched man is seized with difficulty of breathing, apoplexies or lethargies. The heart also, the principle and fountain of life, sinks through want of its usual force, and “the broken chariot falls into the pit.” The ancients indeed did not know of the circulation of the blood; but they could not be ignorant, that it was moved through the body, that it cherished the viscera and members by its heat; and lastly, that it concreted and grew cold in death.

But nothing in this whole discourse is so much worthy of our serious attention as these words, with which he closes it. “The dust returns to the earth, such as it had been; and the spirit

“ returns to God, who gave it.” For by these words his intention seems plainly to have been, to refute the ignorant notions of those, who thought that the soul perished with the body, and to assert its immortality.

C H A P. VII.

The disease of king NEBUCHADNEZZAR.

THOSE things, which are related of Nebuchadnezzar king of Babylon, appear so surprising and contrary to nature, that some interpreters have imagined that he was really transformed into a beast. For “ being driven from the company of
“ men for seven years, his dwelling was with the beasts of the
“ field ; he fed on grass as oxen ; his body was wetted with the
“ dew of heaven ; his hair and nails were grown like those of
“ birds. At length, at the end of that space of time, his under-
“ standing was restored to him, and he was established in his
“ kingdom, and excellent majesty was added unto him. Now
“ his crime was pride, and the contempt of God ^a.”

All these circumstances agree so perfectly well with hypochondriacal madness, that to me it appears evident, that Nebuchadnezzar was seized with this distemper, and under its influence ran wild into the fields : and that, fancying himself transformed into an ox, he fed on grass in the manner of cattle. For every sort of madness is, as I shall specify more particularly hereafter ^b, a disease of a disturbed imagination ; which this unhappy man laboured under full seven years. And through neglect of taking proper care of himself, his hair and nails grew to an excessive length ; whereby the latter growing thicker and
crooked.

^a See Daniel, Chap. iv. and v.

^b See Chap. ix. of Demoniacs.

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 crooked, resembled the claws of birds. Now, the ancients called persons affected with this species of madness *λυκανθρώποι* or *κυνανθρώποι*; because they went abroad in the night, imitating wolves or dogs; particularly intent upon opening the sepulchres of the dead, and had their legs much ulcerated either by frequent falls, or the bites of dogs^c. In like manner as the daughters of Prætus related to have been mad, who, as Virgil says,

—— *Implerunt falsis mugitibus agros* ^d.

—— With mimick'd mooings fill'd the fields.

For, as Servius observes, Juno possessed their minds with such a species of madness, that fancying themselves cows, they ran into the fields, bellowed often, and dreaded the plough. But these, according to Ovid, the physician Melampus,

—— *per carmen & herbas*
Eripuit furiis ^e.

Snatch'd from the furies by his charms and herbs.

Nor was this disorder unknown to the moderns; for Schenckius records a remarkable instance of it in a husbandman of Padua, who imagining that he was a wolf, attacked, and even killed several persons in the fields; and when at length he was taken, he persevered in declaring himself a real wolf, and that the only difference consisted in the inversion of his skin and hair^f.

But it may be objected to our opinion, that this misfortune was foretold to the king, so that he might have prevented it by correcting his morals; and therefore it is not probable that it befel him in the course of nature. But we know, that those

4 I 2 things,

^c See Ætius, Lib. medicin. Lib. vi. and Paul. Ægineta, Lib. iii. Cap. xvi.

^d Eclog. vi. 48.

^e Metamorph. xv. 325.

^f Observat. med. rar.

de Lycanthrop. Obs. 1.

things, which God executes either through clemency or vengeance, are frequently performed by the assistance of natural causes. Thus having threatened Hezekiah with death, and being afterwards moved by his prayers, he restored him to life, and made use of figs laid on the tumour, as a medicine for his disease^s. He ordered king Herod, upon account of his pride, to be devoured by worms^h. And no body doubts but that the plague, which is generally attributed to the divine wrath, most commonly owes its origin to corrupted air.

C H A P. VIII.

The P A L S Y.

TH E R E are three paralyticks recorded in the holy gospels to have been cured by Jesus Christ^a. The case of one of these, which is the third, having some singularities in it, I shall relate the particulars of it in the words of St. John: “ There is
 “ (says the evangelist) at Jerusalem, by the sheep-market, a
 “ pool, near which lay a great multitude of impotent folk,
 “ blind, halt, and withered, waiting for the moving of the
 “ water. For an angel went down at a certain season into the
 “ pool, and troubled the water: whosoever then first after the
 “ troublinging of the water stepped in, was made whole of what-
 “ soever disease he had. And a certain man was there, who
 “ had an infirmity thirty and eight years. When Jesus saw him
 “ lie, and knew that he had been now a long time in that case,
 “ he saith unto him, Wilt thou be made whole? The impo-
 “ tent man answered him, Sir, I have no man, when the water
 “ is.

^s See above Chap. v. p. 602.
 Matthew, Chap. viii. and ix. and John, Chap. v.

^h See below, Chap. xv.

^a See

“ is troubled, to put me into the pool ; but while I am coming, another steppeth down before me. Jesus saith unto him, Rise, take up thy bed, and walk. And immediately the man was made whole, and took up his bed, and walked.”

This pool, or at least some other in its stead, is shewn to travellers even at this day by the friars who reside there^b. But, what is much more to the purpose, Eusebius asserts that it actually existed in his time, and had two basons ; both of which were filled every year by the rains, at a stated time ; and the water of one of them was of a surprising red colour^c : which last phænomenon he attributes, according to the vulgar opinion, to the sacrifices, which were formerly cleansed there. But I am clearly of opinion, that it was owing to a red earth or ocre, which is frequently found in baths, raised up from the bottom at certain times by the rains, and mixing with the water.

Commentators find more than one difficulty here. For first they enquire what sort of water this was ; next why it could not exert its virtue without being troubled ; then what was the nature of this troubling ; and lastly, concerning the angel they do not agree who he was. Wherefore I will offer my opinion, in a concise manner, on these several points.

First then, mineral waters were in high esteem among the ancients for many diseases : they used them inwardly and outwardly, and recommended them for different distempers according to the nature of the mineral, with which they were impregnated. Thus in paralytick cases, Celsus recommends swimming or bathing in the natural sea or salt water, where it can conveniently be come at ; where it cannot, even in water made salt by art^d. And Pliny says, sulphureous water is useful for the nerves, aluminous for paralyticks, or other relaxed habits of the body.

^b See Cotovici-Itinerarium Hierosolymitarum, Lib. ii. cap. ii. and Maundrell's Journey from Aleppo to Jerusalem, 8vo. p. 107. Oxford, 1714.

^c Onomasticon urbium & locorum sacræ scripturæ, in voce Βηζαθα.

cap. xxvii.

^d Lib. iiii.

body. He likewise adds; They use the mud of those fountains with advantage, especially if, when it is rubbed on, it be suffered to dry in the sun^c. The same author relates strange things of some springs. In Boeotia, says he, there are two springs, one of which retrieves the memory, the other destroys it^f. In Macedonia two streams meet, one of them extremely wholesome to drink, the other mortal^g. And other things of the same nature. To these may be added what Lucian, an eye-witness relates of the river Adonis in the country of the Byblii. The water of that river changes its colour once a year, and turning as red as blood, gives a purple tinge to the sea, into which it runs: and the cause of this phænomenon he ascribes to its passing through mount Libanus, whose earth is red^h. Nor is it foreign to the purpose to observe, that there are wonderful eruptions of water in some countries. In the province of Connaught in Ireland, there is a fountain of fresh water on the top of a high mountain, which imitates the tide, by sinking and overflowing twice a dayⁱ. A certain spring in Hungary in the county of Saros, is under the influence of the moon: since it is well known to increase with the moon's increase, to diminish with its decrease, and to run quite dry at the great change or new moon^k. In fine, medicinal waters were not uncommon in Palestine, the accounts of which are collected by that great master of oriental literature, Hadrian Reland^l.

Nevertheless those who contend for a miracle in this place, say that there are no baths known, which can cure all distempers; nor any that retain their virtue but one single month in the year: they likewise add, that it was the action of the angel troubling this water, that gave it its sanative qualities. Those who are of a different sentiment, enumerate a number of waters,

^c Lib. xxxi. sect. 32.

^f Ibid. sect. 11.

^g Ibid. sect. 19.

^h De

Dea Syria.

ⁱ Vid. Ortelii Theatrum orbis terrarum.

^k Vid. Geo.

Wernher. de admirandis Hungariæ aquis.

^l Palæstina ex monument. vet.

illustr. p. 300, &c.

ters, which become salutary at certain times of the year, by being then charged with metallick salts; the mud of which being brought up from the bottom, has been serviceable in many diseases. Wherefore they say, it is not just to have recourse to a supernatural power for effects, which may be produced by the ordinary course of nature. But as far as I am able to judge of these contradictory opinions, a middle way between them seems to me to come nearest the truth.

For my notion of the matter is, that the water of this pool acquired its medicinal virtues from the mud settled at the bottom, which was charged with metallick salts, perhaps from sulphur, allum, or nitre. And whenever it happened that the water was troubled by any natural cause whatsoever, perhaps a subterraneous heat, or rains; these salts were raised up and mixed with it, and might well be beneficial to those, who went down into the pool, before the metallick particles subsided. Wherefore it is no wonder, that there lay, in the porches of this bath, which the evangelist says were five in number, a great multitude of impotent folk waiting for the moving of the water; and especially of such as laboured under those diseases, for which it was serviceable, as blindness, palsies, and decays. And it was very natural for every individual person to endeavour to get into it as soon as possible; for fear of being frustrated of their cure by the subsidence of the mud. Wherefore he who first stepped in, experienced the virtue of the water.

The next circumstance to be observed is, that the fact here related, happened when there was a feast of the Jews, that is, the pentecost. And we learn from Eusebius, that this method of curing prevailed but once in a year^m. But it is well known that this feast was celebrated in the month of May or beginning of June: which is a very proper season for the virtues of medicinal waters. Upon which account the patients flocked thither

^m Loco citato.

ther the more eagerly, that they might catch a medicine, which they could make use of but once a year.

Lastly, with relation to the angel, who is said to have troubled the water at a certain season; those who contend for a miracle, attribute the sanative quality of the pool to him. But we have already taken notice, that whenever any thing uncommon or surprising happened, of which the Jews could not investigate the cause, they were accustomed to say, it was done by the angel of the Lord. Yet it is possible, that God might have added this miraculous circumstance to natural effects, that this pool should be sanative, at one certain time of the year only, and that too, when the whole nation were assembled to celebrate their solemn festival; and to him only, who first went into it. The reason of which proceeding (if it be allowed to form a conjecture on the divine counsels) might perhaps have been, that God was pleased to testify by so manifest a sign, that he would not, as he had promised, entirely abandon his chosen people; before the coming of the Messias.

Wherefore upon the whole, this salutary virtue of the water, which might be medicinal by nature, seems to be so regulated by God, as at the same time to afford the Jews a token of his presence. But the power of Christ, administered to this infirm man, a more noble remedy than that water, his evil-chasing wordⁿ. And this power was the more seasonable in this case, because the disease was of so many years standing, that it could not be removed by a natural remedy: whence his divine virtue shone forth the more brightly.

ⁿ Ἀλεξίμακον.

C H A P. IX.

OF DEMONIACKS.

THAT the Demoniacks, *δαιμονιζόμενοι*, mentioned in the gospels, laboured under a disease really natural, though of an obstinate and difficult kind, appears to me very probable from the accounts given of them. They were indeed affected various ways. For sometimes they rent their garments, and ran about naked; striking terror into all those whom they met, and even wounding their own bodies; so very furious, that though bound with chains and fetters, they broke their bonds, and rambled in the most lonely places, and among the sepulchres of the dead. Sometimes also they cried out, that they were possessed by many devils, which they imagined could pass out of themselves into other bodies^a. At other times, either they were worried, and made a hideous noise^b; or were thrown on the ground, without being hurt, and the devil went out of them^c.

These are all actions of madmen; but the dispute is, whether they were wrought by devils, or by the violence of the disease. Thus much is certain, that in those times it was a common opinion among the Jews, that evil spirits frequently took possession of people, and tortured them in so surprising a manner, as if they were agitated by furies. For in the whole catalogue of diseases, which afflict mankind, there is no other, that seems so much to surpass the force of nature, as this, in wretchedly tormenting the patient by fierce distractions of the mind, and excessively strong, though involuntary, motions of the body.

4 K

But

^a See Matthew, chap. viii. ver. 28. Mark, chap. v. ver. 2. and Luke, chap. viii. ver. 27.

^b Mark, chap. i. ver. 23—26.

^c Luke, chap. iv. ver.

But most certainly we find nothing sacred in all this, nothing but what may arise from a natural indisposition of body. And in order to place this my opinion in the stronger light, it may not be improper to give a short discourse on madness; not indeed on that species, which comes on in an acute fever, and goes off with it, which is called a phrenzy, and is always of short duration; but that other sort, which is rivetted in the body, and constitutes a chronical disease.

Wherefore all madness is a disease of an injured imagination, which derives its origin from the mind, having been too long a time fixed on any one object. Hence proceed uneasiness and anxieties of mind concerning the event. And by how much the things, whose images incessantly occur to the imagination, are of greater moment in life, the more violently they disturb the person; examples of which we see particularly in love and religion, wherein hope, fear, despair, and other contrary passions, succeeding each other by turns, drag the person different ways. That this is the case, will not be doubted by any one, who recollects, that a madman often has a good memory; manages his affairs, except when some vain ideas come across his mind, with tolerable prudence, nay sometimes with more than ordinary cunning; and that he oftentimes recovers the intire and permanent use of his reason, by a course of proper medicines. Therefore in this disorder the person is first overwhelmed by terrifying ideas, which are followed by wrath and fury, as attendants on anxiety: whence he threatens and attempts to do acts of the utmost cruelty to those who approach him, and through excess of anguish, frequently lays violent hands even on himself: then he grows again melancholick; and thus rage and dejection of spirits affect him alternately: moreover it is no uncommon thing to see a person under these circumstances, especially when the disease has taken deep root by length of time, seeking unfrequented and solitary places, in order to avoid the conversation of his fellow creatures,

Ipse suum cor edens, hominum vestigia vitans^d.

Gnawing his heart, shunning the steps of men.

Now, people afflicted with this disorder, often live a long time. For all mad folks in general bear hunger, cold, and any other inclemency of the weather; in short, all bodily inconveniencies, with surprising ease; as they enjoy a strength of constitution superiour to what might be easily imagined. Likewise it frequently happens, that an epilepsy comes on madness of a long standing. For these diseases are nearly related; and in this case, we know by experience, that there remain not the least hopes of recovery. Lastly, it is to be observed, that the patient is either frantick or melancholick, according as his habit of body is disposed to receive this or that injury.

But that the casting out of devils, is nothing more than the removal of madness, many do not believe, upon this account, that those things which happen to persons thus affected, seem to them impossible to be done by the force of nature. But certainly these gentlemen are too much strangers to physick, and have not sufficiently attended to phænomena no less surprising, which daily occur in other diseases. Do we not often see that violent affections of the mind are the cause of death? A sudden fright has destroyed many, and even excessive joy has been fatal. A dangerous distemper sometimes passes from one part of the body to another, in the twinkling of an eye. The venom thrown into the mass of blood by the bite of a mad dog, generally lies still a good while; and at the end of some weeks, sometimes months, exerting its strength, it produces symptoms not inferior to those, which are said to be produced by devils. What is more surprising than some things which fall out in pregnancies? If a

4 K 2

pregnant

^d Cicero, Tuscul. Disp. Lib. iii. 26. who has turned into Latin this verse of Homer: "Ον θυμὸν κατέδων, πᾶτον ἀνθρώπων ἀλλεῖνων. Il. Z. ver. 202.

pregnant woman happens to have an eager desire for any thing, and is disappointed, she sometimes marks the foetus with the figure or likeness of the object longed for, on this or that part of the body. And, what is still more, and approaches to a prodigy, upon the mother being terrified by a sudden injury done to any one part, that very part in the child suffers the same evil, and decays for want of nourishment. I know that the truth of stories of this kind, is called in doubt by some physicians; because they cannot conceive, how such things can happen. But many examples, of which I have been an eye-witness, have freed my mind of all scruples on this head. Now, the power of the imaginative faculty is so stupendous, that the mind is not less affected by false, than by true images, when daily subjected to them. This we find by experience in those women, who are called witches, who, being under the influence of such an error of the mind, frequently imagine that they not only converse with devils, but also have entered into compacts with them; and persist in these notions with such obstinacy, that, when they are brought to a trial, they confess themselves guilty of wickednesses, which they never perpetrated, though they know that they must suffer death for their confession. Moreover, every body knows how wonderfully the mind is disturbed in melancholicks. One of them thinks his head is made of glass, and is afraid of stirring abroad, for fear of having it broken: another believes himself to be actually dead, and refuses food, because the dead ought not to eat. There are a thousand stories of this kind. I remember, a man of letters, with whom I was well acquainted, who positively asserted that he was big with child, and was vastly anxious for a happy delivery. I saw two others, who, when alone, fancied they heard the words of people whispering them in the ear. Nor is their case different, in my opinion, who persuade themselves that they see ghosts and hobgoblins. For deliriums are a kind of dreams
of

of people awake; and the mind in both cases affects the body differently, according to the nature of its objects.

From what we have said, it manifestly appears, how many different ways the lessons of imagination, when they are confirmed by long habit, are capable of affecting a man, and entirely ruining his whole frame. But every body knows, that the human mind is disturbed by nothing more than by fear; the cause of which is self-love ingrafted in all men. Whence then, as Cicero very justly observes, there is no nation so savage, no man so rude, as not to have some notion of the gods^e; it is no wonder, that men conscious of wicked deeds, should be struck with the fear of God, whose empire over all created things they acknowledged. For, as they attributed every good thing, every benefit of this life, to the gods; so they were of opinion, that evils and calamities were sent down by them in punishment of crimes. Now, idolatry, as I said above^f, had its origin among the Chaldæans; and at first it consisted in the worship of the sun and moon, but afterwards it was extended to the adoration of dæmons^g. But these were believed to be divine ministers; and that they were originally the souls of heroes and great men, who were worshipped for services done to mankind in general, or to their native country in particular. And this demoniack religion being propagated from the Chaldæans to the Phœnicians, then to the Egyptians, came afterwards to the Greeks, thence to the Romans, and in progress of time to the other nations.

But the Jews, accustomed to ascribe every uncommon or wonderful work of nature to the agency of angels, as ministers of the supreme Deity, could easily work up their minds to believe, that some dreadful diseases, which injured the mind and body together, the causes whereof they could not investigate, arose from the operation of evil angels. For we learn from Philo
Judæus,

^e Tusc. quæst. Lib. i. 13.
Chronology, p. 160.

^f Cap. i. p. 589.

^g See Sir Isaac Newton's

Judæus^b, with whom Josephus also agrees in opinion, that they believed there were bad as well as good angels; that the good executed the commands of God on men, that they were irreprehensible and beneficent; but the bad execrable, and every way mischievousⁱ. But a more illustrious example of this matter cannot be given, than in the narrative of Saul's disease^k, of which I have already treated^l. Nor were madness and the epilepsy the only diseases, which they imputed to devils. When Jesus had restored speech to the furious dumb man, he is said to have done it by casting out a devil^m. And when he had cured another furious person, who was blind and dumb, the Pharisees reproached him with casting out devils by Beelzebub the prince of the devilsⁿ. In fine, Christ himself uses this common way of expression, on occasion of the woman which had a spirit of infirmity eighteen years, whom he freed from that infirmity; by saying, that Satan had held her bound these eighteen years^o.

And this custom of taking madmen for Demoniacks, was not so peculiar to the Jews, but that it prevailed in other nations also. Hence in Herodotus king Cleomenes is said to be driven into madness, not by any dæmon, but by a habit of drunkenness, which he had contracted among the Scythians, whereby he became frantick^p. And whereas δαιμονῆν signifies the same thing as δαιμόνιον ἔχειν, Xenophon uses this word for furere, to be raging mad or furious^q. Moreover Aristophanes, intending to express a high degree of the same disease, employs the word κακοδαιμονῆν, and calls the highest degree of madness, not μανίαν, but κακοδαιμονίαν^r. Hence also, as Aretæus observes, this disease was called morbus sacer, or the sacred disease, because it was imagined that some dæmon had entered into the man^s.

Where-

^b Lib. de gigantibus. ⁱ De bello Judaico, Lib. vii. cap. 6. ^k Sec Samuel (or Kings) Book i. chap. xvi. ^l Chap. iii. p. 599, &c. ^m Matthew, Chap. ix. ver. 32. ⁿ Ibid. Chap. xii. ver. 22. ^o Luke, Chap. xiii. ver. 16. ^p Lib. vi. cap. 84. ^q Memorabil. Lib. i. ^r Vid. Plutum, Act. ii. Scen. 3. ver. 38. & Act. ii. Scen. 5. ver. 15. ^s Διὰ τῆς δαίμονος ἑ; τὸν ἀνθρώπον εἰσόδου. De causis morbo diuturn. Lib. i. cap. 4.

Wherefore the physicians found it absolutely necessary to oppose this false notion with all their might. Because the people were generally persuaded, that diseases, which they believed to be caused by evil spirits, were to be expelled, not by medical skill, but by religious rites and ceremonies. Upon this account the prince of physicians Hippocrates, or at least some one of his scholars, wrote a very useful piece^t, wherein he asserts that no diseases are inflicted on man, immediately, by any divine power; and that those persons ought to be accounted magicians and jugglers, who cover their ignorance with a veil of sanctity, by infusing such notions into the minds of the people.

But with regard to this power of the devils over human bodies, believed equally by the Jews and other nations, I have already said, that the divinity ought not to be made a party concerned in imposing diseases, which may possibly have natural causes; unless it be expressly declared, that they were inflicted immediately by the hand of God^u. For of all the diseases, with which miserable mortals are tormented, there are none so wonderful and dreadful to appearance, but may be the natural consequences of bodily indispositions. Wherefore God himself, if he thinks proper, can employ either natural causes, or the ministry of good angels, to inflict all sorts of diseases on mankind. And I hope no body will believe, that the devils have had the power granted them of torturing men at their wanton pleasure. But to say more on this subject seems the less necessary; because two very learned divines of our nation have already treated it in a full and ample manner^x.

Therefore in order to put an end to these demoniacal diseases, I will now briefly shew, how they are to be treated. And first of all, particular care should be taken, to keep the patient's mind employed in thoughts directly contrary to those, which possessed it before: for one set of ideas gives place to another, and

^t De morbo sacro.

^u Chap. iii. p. 600.

^x See the works of Jos. Mead, 1677, fol. discourse vi. and enquiry into the meaning of Demoniacks, &c.

and by effecting this change, the mind is brought out of the state in which it was : a circumstance, to which the generality of physicians do not give sufficient attention. When this can be brought about, the disease is sometimes speedily cured. But when either the long standing of the distemper, or some other cause, renders this total change impracticable ; at least the strength of the present set of ideas ought to be diminished and destroyed by all possible means. The vain fears of some are to be diverted, and their dismal thoughts dispelled. The daring ferocity of others is to be curbed ; for which end it is often necessary, to use hard words and threats. Likewise sudden frights, which may give the mind a different commotion, from that which before disturbed it, have been found to afford a temporary relief at least. The antients prescribed some corrections, such as bindings and stripes ^v. And indeed it is sometimes necessary to bind those, who are too unruly ; to prevent their doing mischief to themselves or others. But there is the less necessity for torments and stripes, because all madmen are of such a cowardly disposition ; that even the most frantick and mischievous, after being once or twice tied, surrender at discretion, and thence forward refrain from committing any outrage, through fear of the punishment.

As to the medical part, the gross humours of the body are to be thinned, and the disorderly motion of the animal spirits is to be calmed. For which end blood-lettings, emeticks, catharticks, blisters, and setons, also sometimes coolings of the head are to be employed. To these the fetid gums are to be added, especially *assa fetida*, *myrrh*, and *galbanum*. And camphire has been frequently found serviceable in excessive ferocity and want of sleep. But when the disease is accompanied by a fever, nothing is more proper than nitre, given in as large quantities as the stomach will bear. Lastly, the patient is to be kept to a slender diet, and compelled to use exercise, But in all evacua-

tions,

^v Vid. Celsus, Lib. iii. cap. xviii.

tions, a certain degree of moderation ought to be used, lest the madness be changed into a contrary disease, which the antients termed *morbus cardiacus*^z, that is, an excessive weakness of body. In which case, the patient is so far exhausted, that medicines are of no avail; but the miserable dejected man drags the remains of life, alas! generally too long.

^z Idem, lib. iii. cap. xix.

C H A P. X.

OF LUNATICKS.

As some antient physicians attributed the falling sickness to some divine power, so they ascribed madness to the influence of the moon. Yet the Lunatick, *ῥεληνιαζόμενος*, whose disease is described in the gospels, was affected with the falling sickness^a. Wherefore this patient (for there is but one of this kind expressly recorded there) was either mad and epileptick at the same time, which is not uncommon; or he laboured under a periodical epilepsy, returning with the changes of the moon, which is a very common case. For the account given of him is very short, that he oft times fell into the fire, and oft into the water. Now in this distemper a person falls down suddenly, and lies for some time as dead; or by a general convulsion of his nerves, his body is agitated, with distorted eyes, and he foams at the mouth. But at length he recovers out of the fit, and has no more knowledge or remembrance of it, than if nothing had happened to him. Yet Jesus is said to have rebuked the devil, and he departed out of him, and the child was cured. That this child's case was epileptick, appears more manifestly from the account given of it by the evangelist, who was also a

4 L

physician:

^a Matthew, chap. xvii. ver. 15. & 18.

physician: for he says, that as soon as the spirit has seized the patient, he cries out, foams at the mouth, and is torn and worried by him ^b.

Now, as to these *Ζεληνιαζομένοι*, who are subjoined to the demoniacs, as if their diseases were different, and whom Jesus is said to have cured ^c; they were either mad, or mad and epileptic together, which is not an uncommon case, as we have just now said. And as to devils, we have treated of them sufficiently. But with relation to the moon, there is not the least reason to doubt, but that the regular returns of the paroxysms at certain times of the month, gave occasion to men to believe, that this disease was lunar. For that planet has such a real influence on this disease, that it frequently happens to some patients, never to be seized with the fit but about the new moon; which seems to join its energy to those causes, that are adapted to produce this evil. But the manner of accounting for this I have delivered in another place; where I have plainly shewn that our atmosphere has its tides as well as the sea ^d.

And indeed the great Hippocrates has long since taught, that this disease is owing to natural causes, and consequently, by no means divine ^e. For although in his time, neither the inward parts of the animal body, nor the properties of the blood and humours, especially of the nervous fluid, were sufficiently known; yet by his great sagacity and experience, he has left us several useful observations, in relation both to the nature of the disease, and to its cure. For he has shewn, that it arises from too great a quantity of humours in the brain; and therefore that the best method of cure is to dry up, and lessen the quantity of this peccant matter; without having recourse to incantations and juggling tricks, so much in use in those days.

But when in succeeding ages, the use of medicines became more common, a great number of remedies for this dreadful disease

^b Luke, chap. ix. ver. 39, &c.
morbo sacro.

^c Matthew, chap. iv. ver. 24.

^e See Influence of the Sun and Moon, chap. i. and ii.

^d De

disease were invented, some of which indeed were too filthy and shocking: such as drinking the warm blood of a gladiator just slain; eating human or horse's flesh, the testicles and penis of some animals, and other things of the same kind^f; as if matters so repugnant to nature, could be contrary to such grievous defects of it. For so it often happens, that when a rational medicine is not to be found, any improper and rash one is attempted. But such experiments are to be abandoned to itinerant quacks, and credulous old women. Though even in our days our art is not sufficiently purged of this filth in these cases; seeing the dung of some birds, and the hoofs of quadrupeds are still ordered to be swallowed down by the sick. But whereas chemistry has furnished us with the means of extracting the salts, and other most active principles from bodies; to me it is matter of admiration, why physicians do not choose to order these principles to be taken pure into the body, rather than the coarse and fœculant substances, that contain them; which are always disagreeable, and sometimes hurtful also, to the stomach. But this most difficult distemper demands helps far superiour to these; nor will any one method of cure answer in all cases, but the course must be altered according to the difference of constitution, &c. However, I will here propose those things, which have been found to be most generally serviceable.

Blood is to be taken away several times, according to the strength of the patient, in order to check its impetus. Vomits are to be administered now and then, but catharticks more frequently. It is particularly requisite to draw the redundant humour from the head, which is done by blisters; but better, by applying a caustick near the occiput, and making an issue, which is to be kept constantly running.

These remedies contribute indeed to weaken the paroxysms; but for removing the cause, when it can be done (for sometimes it cannot) other helps are requisite. For it is manifest, that the

^f See Celsus, lib. iii. cap. xxiii. & Cæl. Aurelian, lib. i. cap. 4.

cause lies chiefly in the nervous fluid, commonly called animal spirits. But to investigate the manner how this fluid is affected in diseases of this kind, would, in my opinion, be a fruitless labour. However, as I have shewn on another occasion^g, that it consists of very minute particles secreted from the blood in the brain, and receives and imprisons a considerable quantity of that elastick matter, universally diffused throughout all nature; it cannot be doubted, but that it may be so corrupted by some indisposition of the body or mind, as to become more or less improper for executing the functions of life, and perform all animal motions, not at the command of the will, but in a disorderly manner, and with a certain ungovernable impetuosity. Now the best remedies for correcting this depraved condition of the animal spirits, are chiefly those, which have the most powerful faculties of attenuating the humours, and throwing them out of the body by sweat. Of these the most excellent are the root of wild valerian, Russian castor, the fœtid gums, and native cinnabar, taken daily in pretty large quantities; with the interposition of catharticks at proper intervals, among which there is none better than the tinctura sacra. I have long known by experience, that the celebrated misletoe of the oak, is an useless weed. And indeed how can it be otherwise, since it has scarcely any taste or smell, and is entirely indebted to the religion of the druids for its great character. Wherefore it is to be ranked with those other frivolous things, which superstition has introduced into physick; unless a person can work himself up into a belief, that the golden sickle, with which it was cut down, the priest's snow-white garment, the sacrifice of white bulls, and other such trifling circumstances, are conducive towards a cure^h.

^g Account of Poisons, introduction.

^h Plin. hist. nat. lib. xvi. sect. ult.

C H A P. XI.

The issue of blood in a woman.

SAINTE Matthew relates, that “ Christ, by his word alone, “ cured a woman who had been diseased with an issue of “ blood for twelve years ^a.

And here arises a question, concerning the nature of this disease. But as the words in the Greek are *γυνή αιμορροῖσα*, I am of opinion, that it was a flux of blood from the natural parts, which Hippocrates ^b calls *ῥόον αιμαλώδη*, and observes, that it is necessarily tedious. Wherefore having been exhausted by it for twelve years, may justly be said to be incurable by human art.

^a Chap. ix. ver. 20.

^b De morb. lib. i. sect. 3.

C H A P. XII.

Weakness of the back, with a rigidity of the back-bone.

“ **T**HERE was a woman which had a spirit of infirmity
 “ eighteen years, and was so bowed together, that she
 “ could in no wise lift up herself, and Jesus laid his hands on
 “ her, and she was freed from her infirmity, and immediately
 “ made strait ^a.”

This woman was *συγκύπτουσα*, that is, stooping forward ; being unable *ἀνακύψαι*, or to lift up her head. Now that spirit, according to the common way of speaking of the jews, was
 Satan.

^a Luke, chap. xiii. 11, &c.

Satan. For thus Christ himself, answering the ruler of the synagogue, who was angry that the woman had been cured on the sabbath day, says, that Satan had held her bound these eighteen years. And exactly in the same sense St. Mark employs πνευμα ἄλαλον for a spirit, which obstructed the faculty of speech ^a.

This infirmity often befalls those, who have been very long afflicted with a disorder of the loins: whence the muscular fibres of that part become contracted and rigid. Wherefore it is very probable, that this tedious disease proceeded from that very cause, and was curable by the divine assistance only.

^a Chap. ix. ver. 17.

C H A P. XIII.

The bloody sweat of CHRIST.

SAINTE Luke relates of Christ himself, that, “when he was in an agony by the fervency of his prayers, his sweat was like drops of blood falling down on the ground ^a.”

This passage is generally understood, as if the Saviour of mankind had sweated real blood. But the text does not say so much. The sweat was only ὡσεὶ θρόμβοι αἱμάτων, as it were, or like drops of blood; that is, the drops of sweat were so large, thick and viscid, that they trickled to the ground like drops of blood. Thus were the words understood by Justin Martyr, Theophylactus, and Euthymius. And yet Galen has observed, that it sometimes happens, that the pores are so vastly dilated by a copious and fervid spirit; that even blood issues through them, and constitutes a bloody sweat ^b.

^a Chap. xxii. ver. 44.

^b Lib. de utilitate respirationis.

C H A P. XIV.

The disease of JUDAS.

IN the number of diseases, I rank the death of Judas, the wicked betrayer of Christ; of which I shall treat the more willingly, because very learned interpreters of the holy scriptures have run into different opinions concerning it. And about fifty years ago, two famous professors of history in the university of Leyden, Jacobus Gronovius and Jacobus Perizonius, handled this controversy in print with too much passion. For polite literature does not always polish its admirers.

The origin of the dispute was this. Perizonius had published *Ælian's Variæ historiæ*, with his own notes and those of others; where taking occasion from what *Ælian* says of *Polia-ger*^a, he diligently examines the signification of the verb *ἀπαγγεσθαι*, which *St. Matthew*^b employs in relating the death of Judas; and insists that that word does not only mean strangling with a halter, but also sometimes excessive grief, by which a person is brought to the brink of death, and frequently even destroys himself. This criticism was taken amiss by Gronovius, who had already published a book *De morte Judæ*, wherein he had said that the wretch had voluntarily put an end to his life by a halter; wherefore he drew his pen, in order to refute his adversary's reasonings, and corroborate his own. Moreover he quarrels with Perizonius about the phrase *πρηνὴς γενόμενος*, which he positively affirms ought to be understood not of a dying man, but solely of one actually dead, or of a dead body cast or tumbled down. For *St. Matthew* simply says *ἀπὸ γέλαο*^c, but *St. Luke* more fully, *πρηνὴς γενόμενος ἐλάκησε μέσος, καὶ ἐξεχύθη πάντα*

^a Lib. v. cap. viii.^b Chap. xxvii. ver. 5.^c Ibid.

πάντα τὰ ζπλαγχνα αὐτῷ^d, that is, falling headlong, he burst asunder in the midst, and all his bowels gushed out. Wherefore, if the verb ἀπάγχεσθαι can bear no other signification than that strangling, which is performed by a halter, it is plain that the two evangelists do not agree together; unless we say with the learned Casaubon, that Judas hanged himself, but the rope broke, and he tumbled headlong down. But this does not explain the manner of his death; which St. Luke manifestly seems to have intended; but barely adds a circumstance of little moment, which happened after it, or at the very instant of it. Upon the whole it is certain, that by this word is not only meant suffocation by hanging, but also excessive grief, with which those who are violently overpowered, frequently compass their own death. For, as Ovid says: strangulat inclusus dolor. And indeed Perizonius has clearly proved this point by a number of examples, drawn from antient authors^e. Nor is it less to be doubted, but that the expression πρηνὴς γενόμενος, may be used for one, who voluntarily throws himself down, as well as for one, who falls headlong by some accident: which he has amply demonstrated.

This controversy cost more than one dissertation. But after seriously considering the strength of the arguments produced by both parties; I am of opinion, that the words of St. Matthew may be reconciled with the account given by St. Luke from St. Peter's speech, in this manner. When that most unhappy traitor saw that Christ was condemned to death, he began to repent of his deed; and being thereupon wrecked with grief and despair, or seized with the swimming in the head (which often happens in such cases) he fell headlong down some precipice; or, which is more probable, he designedly threw himself down, and his body chancing to pitch on some large stone or stump of a tree, his bowels burst forth, and he was killed.

^d Acts, chap. i. ver. 18.

^e Vid. dissert. de morte Judæ, & responsiones duas ad Gronovium, Lugd. Bat. 1702 & 3.

killed. Wherefore Matthew declared his tortures of mind, which made him destroy himself; but Luke has clearly and properly determined the manner of his death. Thus this kind of death ought, with good reason, to find a place in the list of diseases, upon account of the real disorder of the mind.

C H A P. XIV.

The disease of king HEROD.

THE disease with which Herod Agrippa is said to have been smitten, by the just judgment of God, in punishment for his pride and of which he died, is remarkable. For he finished his miserable life *ζωληκόβρωτος*, that is, eaten by worms, as the sacred historian relates, in these words; “ Upon a set day, Herod, arrayed in royal apparel, sat upon his throne, and made an oration unto them: and the people gave a shout, saying, it is the voice of a god, and not of a man. And immediately the angel of the Lord smote him, because he gave not God the glory; and he was eaten of worms, and gave up the ghost ^a.” Josephus indeed, in his account of the fact, makes no mention of worms, but says that he was suddenly seized with violent gripings, and after being incessantly tortured with pains in his bowels for five days, he expired ^b. But St. Luke has informed us, that the worms, by which his bowels were eroded, were the cause of the gripes.

Now the greatest singularity in this king's disease is, that it was instantly inflicted on him from heaven (which he himself acknowledged according to Josephus ^c) otherwise as to verminose putrefaction in human bodies, we have several instances of

^a Acts, chap. xii. ver. 21—23.

^b Antiq. Jud. lib. xix. cap. viii. sect. 2.

^c Ubi supra.

it. For this very king's grandfather, Herod, surnamed the Great, is said to have laboured under this disease a long time, till at length it threw him into a decay, of which he died ^d. Likewise Herodotus relates of Pheretima, the mother of Arcefilaus, king of Cyrene, that she was rotted alive by worms ^e. And it is recorded of the Roman emperor Valerius Maximianus, that this same loathsome disease not only eat away his genital members, but put an end to his life ^f. Wherefore it was impossible, but that some at least of the Greek physicians must have observed some cases of this kind. And accordingly Galen has proposed medicines for ulcers, *ζκώληκας ἔχοντα*, that is, abounding with worms ^g. For he says, in abscesses there are frequently found animals, *ζῶα*, very like those, which are engendered from corruption ^h. And Philoxenus in *Ætius* says, that in the humour of *Atheroma's*, he sometimes found animals, like gnats or little flies ⁱ. In fine, Paulus *Ægineta* teaches the method of getting rid of them ^k.

In so clear a case, it is needless to collect a greater number of authorities from the ancients, especially since several modern physicians have made the same observations. For Marcellus Donatus mentions a person of high rank, extremely fat, whose belly was eroded and mortified by little worms engendered in his skin, which was excessively distended by fat and humours; and these worms were not unlike those produced in old rotten cheese ^l. The learned Nicolaus Tulpius saw worms very like these, issuing with the urine out of the body of a very celebrated physician ^m. And the *Ephemerides naturæ curiosorum*, contain three remarkable cases of this kind. The first is that of a cer-

^d Josephus Ant. Jud. lib. xvii. cap. vi. (an. viii?) sect. 5. & De Bello Jud. lib. i. cap. xxxiii. sect. 5.

^e Hist. lib. iv. a fine *Ζωσα εὐλείων ἐξεῖσαι*.

^f Sext. Aurel. Victor. Epitom. & Pompon. Læti Rom. Hist. compend. ^g De compos. Medic. per genera, lib. iv. cap. x.

^h Lib. de tumorib. præter

nat. cap. iv.

ⁱ Lib. xv. cap. vii.

^k Lib. iv. cap. xlii.

^l De

hist. medic. mirab. lib. i. cap. v.

^m Observ. medic. lib. ii. cap. i.

tain Frenchman, whose blood was so corrupted, that very minute animals came forth day and night with horrid tortures, through most of the outlets of the skin, as the eyes, nose, mouth, and bladder; and at length put an end to his miserable life ^a. In the second, black worms, not unlike scarabæi or beetles, came out of an abscess formed in the calf of the leg of a girl ^o. And in the third it is said, that very small white worms issued with the milk from the breasts of a woman in childbed ^p. Nor can I omit two similar cases, one of which is related by Poterius, the other by his commentator Frideric Hoffman. The former attended a countryman, for a tumour on his right knee, out of which, when opened, little live worms issued, which caused an intolerable pain in the part by their bitings. And the latter saw a tradesman, who had a hard tumour about the veins of the arms, which was very troublesome to him. This was opened by a surgeon several times without any benefit; until an ulcer was formed, out of which he took a great number of little black worms, armed with stings or prickles ^q.

Now these histories, wonderful as they seem, are not to be refused credit. For all nature is animated in a surprizing degree. The air which we breathe, the food which we eat; all fluids especially, are full of animalcula of very different kinds. Whence it is possible, that some of these, being received into our bodies, and conveyed into the minute passages of the softest parts, as into nests, may there grow, as worms do in the intestines, to their proper size. Hence by the obstruction of the smallest vessels, tumours arise; which being suppurated by heat, and bursting, pour forth their foul offspring in the shape of worms.

Wherefore I cannot agree with those interpreters, who imagine that Herod was consumed by, and died of the phthiriasis, or louzy disease. For *Κλώληξ* is a different creature from *φθεῖρ*;

^a Decur. 2. ann. 5. append. artic. 38.

^o Ibid. artic. 52.

^p Ibid.

artic. 109.

^q Poterii opera cum annot. Frid. Hoffmanni edita, Francof.

1698. pag. 72.

this corrodes the surface of the skin, that the inner parts of the body. Nor can it admit of doubt, that St. Luke, who was a physician, well understood the meaning of both the words. And yet I know that the disease proceeding ὑπὸ τῶν φθειρῶν is by some learned men confounded with that caused ὑπὸ τῶν ζκωλήκων; of the first of which Pherecides Syrius ^r, and Lucius Sylla ^s, are said to have died. Whereupon Kuhnius says ^t, I look upon the word ζκωλεκόξρωλος in St. Luke, and φθειρόξρωλος in Hefychius ^u, to be synonymous terms: and his reason is, because lice are worms.

^r Ælian. var. hist. lib. iv. cap. xxviii.

^s Plutarcho in ejus vita.

^t Not. ad Ælianum.

^u Lib. de vit. philos.

O R A T I O

A N N I V E R S A R I A

H A R V E I A N A :

In T H E A T R O

Regii Medicorum Londinensium Collegii

H A B I T A,

Ad Diem xviii OCTOBRI S, M.DCC.XXIII.

PRÆSIDI ILLUSTRISSIMO
SOCIISQUE DOCTISSIMIS
REGII MEDICORUM LONDINENSII COLLEGII
DE ARTE MEDICA INDIES OPTIME MERENTIBUS
ORATIONEM HANC
IN PRÆSTANTISSIMORUM HOMINUM LAudem
QUI MAXIMIS SUIs BENEFICIIS
ARTEM ILLAM SUSTENTARUNT
AMPLIFICARUNT ET EXORNARUNT
HABITAM
L. M. Q. D. D. D.
RICHARDUS MEAD.

O R A T I O

A N N I V E R S A R I A

H A R V E I A N A.

ILLUSTRIS SIM E P R Æ S E S,
 C O L L E G Æ S P E C T A T I S S I M I,
 A U D I T O R E S H U M A N I S S I M I,

SI, quantam vim habent ad humanas mentes amore laudis ac gloriæ incitandas magnarum virtutum exempla, tantum ego ingenii & eloquentiæ in laudandis illis heroibus, quorum hodie nobis commemoranda sunt beneficia, afferre possem; haudquaquam sane vererer, ne aut illorum meritis parum conveniens, aut vestris auribus minus grata, quam nunc habiturus sum, foret oratio. At vero, cum hæc res longe aliter se habeat, & neque natura aptus, neque usu instructus ad dicendum, jussu vestro hoc muneris susceperim; ne importuna artis affectatione vobis sim tædio, historici potius, quam oratoris partes agens, honores medicinæ recensebo; & per quos maxime reges aut principes, & quos apud populos, creverit salutaris hujus professionis gloria, in brevi quasi tabella vobis proponam. Et dum hoc faciam, partem laudis istius haud infimam nostræ genti merito attribui debere manifeste ostendam; quo nihil aut mihi ad

recitandum jucundius, aut vobis, opinor, ad audiendum acceptius, aut omnibus nobis ad prædicandum honestius esse potest.

Ab Ægyptiis autem, antiquissimis illis omnis fere sapientiæ magistris, incipiam; apud quos tanto fuit in honore ars nostra, ut ne reges quidem ipsi illam facere infra dignitatem suam existimaverint. Osirin & Isin in primis reginam medendi peritia excelluisse accepimus. Post horum tempora medicis ex publica pecunia dabantur præmia; & Sacri titulum ferebat liber, in quo descriptæ fuerunt leges, ad quas morbis acutis laborantes curare licebat^a.

Græci uti artes omnes subtilius, quam Ægyptii excoluerunt; ita præsertim medicinam, quæ ex cognitis paucarum herbarum viribus, & populari experientia constabat, in scientiam redegerunt. Fama celebres apud eos antiquitus fuerunt scholæ non paucæ, Rhodia cum primis, Crotoniensis, Cnidia, Coa, & Smyrnæa. Crotoniensem illustravit Democedes, cui Darius rex Persarum, inter captivos apud ipsum agenti, acceptum restitutæ sanitatis beneficium magnis divitiis & honoribus rependit; non sine insigni humanitatis, qua nihil magis medicum commendat, in Democede exemplo. Cum enim rex medicos Ægyptios, qui se in principio morbi imperite tractassent, occidi jusserat; ille culpæ hujus veniam impetravit, & gratiæ loco habuit concessam illis cum vita libertatem^b.

Cæterarum autem omnium gloriam Coæ obscuravit scholæ felicitas, postquam ex illa prodierat, qui primus hanc disciplinam a studio sapientiæ separavit, divinus Hippocrates. Magno nomini adsurgimus omnes! & parentem medicinæ veneramur! qui non tantum sapientissimis præceptis artem hanc formavit, sed & ipse vita & moribus perfectissimi medici exemplar expressit. Tanto itaque viro maximos honores delatos minime miramur, neque hos tantum a Cois suis, qui imagine ipsius nummos signarunt^c, sed etiam ab universa Græcia; quæ communi concilio,

^a Diod. Sicul. l. i. p. m. 74.
Numm. in Titul.

^b Herodot. lib. iii. c. 129, &c.

^c Vid.

quod “venientem ab Illyriis pestilentiam prædixerat, discipulos-
 “que ad auxiliandum circa urbes dimiserat, honores illi, quos
 “Herculi, decrevit ^d.” Civem porro adscripserunt Athenienses,
 auro coronarunt, & victum illi & posteris in Prytaneo dederunt ^e,
 qui honos in Græcia maximus habebatur. Athenienses enim,
 cultissimi scientiarum æstimatores, hanc artem plurimi semper
 fecerunt; apud quos antiqua lege cautum fuit, “Ne quis servus,
 “neve qua fœmina medicinam disceret ^f.” Et tam ab iis, quam ab
 aliis Græciæ civitatibus, honores & immunitates eximiæ publi-
 citus medicis concedebantur ^g.

Hinc maximi omni ævo apud Græcos viri medicinam callere
 laudi sibi duxerunt. Pythagoras & Democritus primi omnium de
 virtutibus herbarum scripsere ^h. Aristoteles, hæreditario quasi
 jure ad se pertinere hanc artem ratus (ab Æsculapio enim genus
 duxit ⁱ) medicinam non didicit tantum, sed & factitavit ^k; li-
 brosq; de plantis, de anatomicis, & *ιατρικῶν* etiam edidit ^l.
 Quin & medendi peritia Magni Alexandri benevolentiam sibi pri-
 mum conciliavit; quem cum gravi morbo oppressum liberasset,
 hanc ab eo facultatem rex invictissimus doceri voluit; neque il-
 lam interdum exercere vile, aut a summa sua dignitate alienum,
 judicavit ^m. Crevit postea hæc laus in familia Aristotelis, cujus
 ex filia nepos, nomine Erasistratus, magnam consecutus est fa-
 mam. Is sectam longe celeberrimam condidit; quam in scho-
 la Smyrnæa, jam antea memorata, ad suam fere ætatem, quo tem-
 pore illi præsidebat Hicesius, Strabo floruisse tradit ⁿ. Tam
 insignis porro fuit, qui in hac urbe medicis habebatur honos,
 ut mihi sane gratuler, qui, hanc occasionem nactus, notitiam il-
 lius ex antiquitatis tenebris jam primus in lucem proferam.
 Honos autem, quem dico, is erat, quo communiter cum præ-

^d Plin. N. H. l. vii. c. 37.

^e Soran. in Vit. Hippocrat.

^f Petit.

Leg. Attic. l. iii. tit. 8.

^g Lucian. Abdicat. p. m. 457.

^h Plin.

l. xxv. c. 2.

ⁱ Diog. Laert. in Vit.

Ælian. Var. Hist. l. v. c. 9.

Diog. Laert. ibid.

^m Plutarch. in Vit. Alex.

Georg. lib.

lib. sub nom.

toribus, summis nimirum urbis magistratibus, ornabantur, ut nomen eorum nummis imprimeretur. Præterea quo magis ostenderent Smyrnæi, in quanto pretio esset apud eos ars nostra, medicorum nomina deorum salutarium imaginibus in nummis adjungi volebant; quorum multi ex altera parte caput Hygiæ, ex altera vero Jovis Æsculapii effigiem cum perspicuis medendi artis insignibus exhibent. Neque Erasistrateos suos tantum ita honestabant; sed nonnullis etiam æmulæ Herophileorum scholæ, quæ iisdem ætatibus in loco procul dislito, “fanum Mensis Cari” appellato, inter Laodiceam ad Lycum & Carura, magna cum laude florebat°, eundem honorem tribuebant.

A Græcis ad Romanorum tempora devenientibus minus augusta primo intuitu, & parum læta sese offert rerum nostrarum facies. Servos fuisse, qui primi Romæ medicinam fecerunt, vulgo creditur; & pulsos urbe exulasse medicos, Catone censore, scriptis prodiderunt nonnulli. Hæc, in opprobrium artis prolata, quodnam habeant fundamentum, operæ est disquirere. De servitute mox dicam: primum autem de exilio quæstionem, calumniam rectius dixeram, paucis expediam. Nulla certe veterum annalium fide, nullis antiquorum monumentorum indiciis nititur hoc commentum. Primus, quod sciam, in vulgus edidit vanissimus ille “De vanitate scientiarum” scriptor, Cornelius Agrippa^p. Ansam vero ad hoc fingendum dedit Plinius^q, qui “populum Romanum ultra sexcentefimum annum sine medicis degisse, & exper-
“ tam tandem damnasse medicinam,” adductis etiam Catonis ad Marcum filium adversus hanc artem dicteriis, memoriæ mandavit. Tantum autem valuisse aut atrocem animum, aut auctoritatem Catonis, ut medicos urbe pelleret, nusquam legimus. Neque damnavit omnem medicinam populus; sed in ea, quæ manu curat, secandi urendique sævitiam (quam tamen ipsa non raro imperat misericordia) ut novam, & aspectu terribilem improbavit.

° Strabo dict. loc.
l. xxix. c. i.

^p De Van. Scient. cap. 83.

^q Nat. Hist.

Sed missum faciamus hoc convicium, quod non semel antea diluerunt viri eruditi; & qualis fuerit medicorum Romæ degentium conditio, præsertim num servilis, paululum dispiciamus. Romani artes omnes a Græcis acceperunt, & sero quidem, “ rudi
 “ scilicet & bellicosa civitate non magnopore liberalibus disciplinis
 “ vacante.” Nec grammaticam quidem, aut poeticam, ante annum quingentesimum excoluerunt¹. Primus autem, anno supra quingentesimum tricesimo quinto, medicus e Peloponneso Romam venit Archagathus; cui is honor habitus est, ut “ jus Quiritium ei datum sit, & taberna in compito Acilio empta ob id
 “ publice.” Magna seculo sequenti fama fuit Asclepiadis Bithyni, tam dicendi quam medendi arte insignis, quo se medico amicoque usum fuisse L. Crassus apud Ciceronem testatur²; ex cujus etiam posteris, ut videtur, “ Calpurnius Asclepiades, a divo Trajano parentibus, sibi, & fratribus septem civitates impetravit.” Neque diu post, cum jam quotidie quæstus causa ex Græcia Romam adirent medici, Julius Cæsar, in cujus manus tunc temporis summa rerum potestas devenerat, omnes hanc artem profectos civitate donavit³. “ In servos autem id beneficium fuisse collatum, vel
 “ suspicari,” ut cum viro inter literatos principe loquar, “ nimia
 “ est stultitia.” Nihil igitur servile, aut tenue quidem, artem nostram adhuc dedecorat. Sed ut plane, & sine fuco, totam rem dicam; simul cum ingenuis multis & doctis viris non pauci scientia & fortunæ bonis inferiores illis temporibus Romam veniebant; qui, etsi non medicamentis, sed manu curarent, medici tamen appellabantur. Hi in divitum & magnatum clientelam se conferebant, & servi agebant, donec civitatem consequerentur; inde liberti, nomen familiæ alicujus Romanæ sibi adsciscere solebant; neque raro, si ingenium studio literarum excoluissent, morbis etiam in-

¹ Sueton. lib. de illust. grammat. in princ.

Tuscul. Quæst. in princip. ubi vid. not. Davissii.

c. 1.

² De Orat. l. i. c. 14.

cherch. Curieus, Dissert. 27.

in dict. vit. Suet. c. 4.

³ Cic. in Brut. c. xviii. &

⁴ Plin. N. H. l. xxix.

⁵ Inscript. antiq. apud Spon. Recherch.

⁶ Sueton. in Vit. c. 42.

⁷ Casaub.

ternis medebantur, & in medicorum clinicorum censum veniebant. Tali conditione fuit Antonius Musa, cui, postquam ejus opera ex ancipiti morbo convaluerat Octavius Augustus, statuam, ære collato, populus Romanus posuit ^b. Augustus quoque ei jus annuli aurei, & immunitatem non ipsi tantum, sed omnibus medicinam profitentibus, in posterum tempus concessit ^c.

Non igitur ars erat servilis apud Romanos medicina; sed liberalis, & tanto in honore, ut etiam pars ejus chirurgica, quæ a servis, & exili sorte hominibus exerceri poterat, libertatem sæpe daret, & magnas opes. Haud exigua sane iis temporibus erant medendi facultatis præmia. Principum medicis annua statuebatur merces. Iis autem, referente Plinio, “ imputavit Stertinius, quod “ quingentis sestertium millibus,” pecuniæ nostræ plusquam ter mille & sexcentis libris, “ contentus esset; cum sexcenta quæstu “ urbis sibi esse, numeratis domibus, ostenderet ^d.” Ipse vero & frater ejus sua pecunia Neapolin operibus exornarunt, & tamen “ census trecenties centena millia sestertium hæredi reliquere ^e.” Omitto plura exempla memorare, neque vobis Cassios, Calpetanos, Arruntios, Albutios, Rubrios sistam, Romana nomina, quæ professione medicinæ & opibus claruerunt. Præterire autem nequeo, in nummis Rubriorum conspici anguem, deæ Salutis signum, monumentum, ut videtur, familiæ sibi medicinæ laudem vindicantis. Miror itaque in nummis istis explicandis neque Patinum, neque Vaillant, viros de re nummaria optime meritos, hanc, arti suæ adeo honorificam, inter alias ejus rei causas longius petitas attulisse ^f. In summa, ita non semper tenui fortuna homines Romæ erant medici, ut etiam imperatorum sæpe amici essent & familiares ^g.

Neque putet quisquam gratia tantum singulari in hunc aut illum collocata fuisse, qualia diximus beneficia; arti habebatur honos, & universis eam profitentibus dabantur immunitates. Col-

^b Sueton. in Vit. Aug. c. 59.

^c Dio. H. R. l. liii. sub fin.

^d Lib.

xxix. c. i.

^e Ibid.

^f Vid. Patin. & Vaill. Fam. Rom.

^g Vid.

Spon. Recherch. Curieus. Dissert. 27.

legium enim, sive scholam, ut vocabatur, medicorum in urbe fuisse, ex antiquis marmorum inscriptionibus apparet ^h. Quales autem legibus dabantur illis immunitates, veterum jurisconsultorum libri nos docent. Exempla e multis pauca tantum proferam. Constantini Magni imperatoris extat hoc rescriptum: “Medicos, & maxime archiatros, grammaticos, & doctores legum, una cum uxoribus & filiis, nec non & rebus, quas in civitatibus suis possident, ab omni functione, & ab omnibus muneribus, vel civilibus vel publicis, immunes esse præcipimus; & neque in provinciis hospitales recipere, nec ullo fungi munere, nec ad judicium deduci, vel exhiberi, vel injuriam pati; ut si quis eos vexaverit, pœna arbitrio judicis plectatur ⁱ.” Nec novo prorsus favore his omnibus beneficiis tum primum facultas hæc salutaris honestabatur. Jam ante enim “medicis & philosophis, ne hospitem reciperent, a principibus fuisse immunitatem indultam,” imperatores Vespasianus & Hadrianus rescripserant ^k. Item Antoninus Pius a muneribus civilibus & publicis “immunes esse medicos” jusserat ^l. Deinde post hos omnes Julianus, qui, nisi nomini maculam fixisset hostile erga Christianos odium, inter sapientissimos imperatores jure censeretur, non sine honorifico utilitatis artis nostræ testimonio, superiorum principum decreta de medicis, lege lata, sancivit, eosque a curialibus muneribus liberos esse voluit ^m. Sed de rebus medicis apud populum terrarum orbis dominum satis, opinor, dictum fuit.

Si medicinæ autem tempora, & varias quasi ætates spectemus, ad Arabes jam, simul cum armis literarum studia agitantes, nos deducit orationis filum. Iis enim seculis, quibus fœda barbaries cæteras fere nationes obduxerat, penes eos permansit artis hujus scientia. Deficiunt quidem hac in parte annales medici, & linguæ suæ difficultatibus involuta in bibliothecarum forulis latent, quæ de medicorum historia gentis illius scriptores memoriæ mandarunt, aliquando forsan in lucem protrahenda. Specimi-

^h Mercur. Art. Gymn. l. i. c. 7.

^k Leg. ult. §. ult. ff. de mun. & hon.

^m Vid. Julian. Epistol.

ⁱ Leg. 6. Cod. de profess. & med.

^l Leg. 6. §. 2. ff. de excusat.

nis autem loco ex ineditis illorum monumentis observarelibet, imperatoris medico annuo stipendio fuisse “ quindecies centena milia drachmarum ”;” quæ, si ad nostram pecuniam exigantur, plusquam tricies mille librarum summam conficiunt. Ingentem sane, & forsan vix credibilem esse hanc principum munificentiam, quis dicet. At non tam ministri, quam consilarii, imo affines regum, apud eos habebantur medici; & terrarum reditus, & urbium præfecturæ illis sæpe in mercedem cedebant.

Postquam, renascentibus literis, antiqui doctrinæ fontes recludi, & in Italia primum, inde & in cæteris Europæ regionibus, fervere studia scientiarum cœperunt, apud alios & alios populos medicina honores varios sortita est; utque gloria aluntur artes, ita hæc semper accepta beneficia magnis in rempublicam utilitatibus rependit. Longum esset scholæ Salernitanæ, Bononiensis, Patavinæ, Montis Pessulani, Parisiensis, & aliarum quam plurimum jura & immunitates explicare; verum illud memorare juvat: ut nusquam honoratior, quam apud nos, extitit medicina; ita nullum collegium, absit verbis invidia, virorum ingenio & doctrina excellentium hoc nostro fuit feracius.

Amplissimus hic dicendi campus sese aperit; sed monet me præscriptum munus, ne exiguum hoc temporis spatium, de medicis optime meritorum memoriæ sacrum, medicorum præconiis effluere sinam; dicant potius exteri, quantum per Anglorum labores in medicinæ studio ipsi profecerint. At quidni dicam rara felicitate id nobis contigisse, ut, qui hic salutaris scientiæ lumina clauerunt, iidem dignitatis nostræ auctores & custodes beneficentissimi celebrentur? Ecquis Linacro, qui sub auspiciis regis invictissimi, Henrici octavi, primus nos auctoritate intruxit, sapi-

ⁿ Osaibea De vitis medicorum, ms. Arab. Drachmæ autem hic non Atticæ, sed Arabicæ intelligi debent; quarum hæ, si Golio credamus in Lex. Arab. tertia parte illis sunt leviores. Nec longe discrepat Gravii sententia, qui, ex comparatione cum granis nostris discrimen petens, veterem Atticorum drachmam grana 67, Arabicam vero $47\frac{1}{2}$ exæquare statuit. Vid. Greaves's Discourse of the Roman Denary, p. 61, 115.

entiozem,

entiolem, & literis cultiolem dicet quempiam? Ecquis Caio, qui insignia potestatis ad decus & ornamentum addidit, arte præstantiolem? An Harveio, qui potentiam opibus auxit, sagaci ingenio, & naturæ scientia, ullum inveniemus parem? Hi nimirum veterum sapientium more, relicta patria, terras alio sole calentes adierunt, Italiam in primis, antiquum illud Musarum sacrarium; ubi parum illis fuit omne disciplinarum genus toto pectore haurire, & domum adferre; adhuc majora animo conceperunt, formam nempe reipublicæ medicæ, qua in unum corpus, quasi membra, coirent artis professores. Amant enim societatem scientiæ; & concordia, tanquam communi anima, vigent. Hinc alius post alium, veluti vicario studio, legibus & statutis sodalitium hoc communiverunt; rerum gestarum annales condiderunt; & solenne convivium, cum grata bene meritorum de nobis commemoratione, instituerunt. Vivite æternum, illustria nomina! Vestræ, dum stabit honos medicinæ, manebunt laudes; stabit autem, quamdiu cura sui tanget mortales, & morbis opportuna reddet corpora in luxum & libidinem proclivis hominum natura. Sed & alios, quos habuimus ejusdem laudis æmulos, silentio premere est nefas; Caldwellum, Gulstonum, Cronium, qui amplissimis honorariis chirurgiæ & incisionis studium promoverunt; ut etiam munificentissimum Hamæum, cui venti ædes nostras, morienti prædiorum suorum hæreditatem debemus. Ut magnæ autem sunt apud bonos virtutis illecebræ, illius præcipue, qua publicæ utilitati consulitur; spectata hæc medicorum liberalitas, & in commune studia sua conferentium generosus ardor, alios quoque viros, sanguine pariter ac literis illustres, in laudis ejusdem partem attraxit. Nec sequior sexus ἀνὴρ ἑὸς esse voluit, ut, quibus ob teneram formam plus est in arte nostra præsidii, aliquid etiam ad ejus decus afferre viderentur. Honoratissimæ igitur fœminæ, regia etiam stripe illustres, Arabella Stuarta, & Maria comitissa Salopiensis, socia beneficentia, ad levandos sumptus in ædibus nostris emendis factos, pecuniam larga manu donaverunt. His adjungam nobilissimum vi-

rorum par, Joannem Lumleium baronem, & Henricum Durnovariæ marchionem ; quorum ille cum Caldwello, quem dixi, junxit munificentiam : hic in tanto nos habuit amore, ut non modo bibliothecam dederit, optimis libris instructissimam ; sed & inter nos censeretur, comitiis nostris interesse, & rem medicam sedulo procurare voluerit. Omne sane felici ! cum & nunc nobis gratulemur optimatē, honoris insignibus illustrissimum, & hos tamen animi magnitudine vincentem, tabulis nostris suo nomine decus & splendorem addidisse.

Non ultra pergā magnorum virorum laudes, quas nec hominis disertissimi vox æquare posset, ingenii culpa imminuere. Humanitatis profecto & scientiæ exempla, quæ vos, collegæ ornatissimi, assidue ostenditis, memoriam illorum quavis oratione longe melius consecrabit. Etenim dum illorum vestigia premitis, quotidianum illis instauratis laudis monumentum, & prudentis consilii, ac bene collocatæ operæ testimonium perhibetis perpetuum. Quis præsidem illustrissimum, strenue ac prudenter auctoritatem nostram tuentem, suspicit ; & Linacri sapientiam haud statim sibi repræsentat ? Quis censoribus imperitorum artis perniciosam audaciam coercentibus, & ne qua in pharmacis nostris conficiendis fraus fiat providentibus, gratiam habet ; vel quæstoris in ærario administrando fidem & frugalitatem laudat ; vel omnes vos denique sine malis artibus salutis civium prospicientes, & pro meritis divitiis & honoribus auctos veneratur : nec eorum, qui primi hujus disciplinæ fundamenta posuerunt, atque hoc domicilium scientiæ condiderunt, benefacta simul honorate prædicat, summisque laudibus in cælum extollit ? Maçti igitur este sapientia, viri clarissimi, cœptam viam pergite. Hac enim ratione laudis æque ac vitæ lampada filiis tradetis ; atque hi iterum nepotibus ; qui, majorum exempla sequentes, collegii hujus jura, decus, & dignitatem, in omne ævum duratura (ita voveo & auguror) suis etiam posteris facta tecta conservabunt. Dixi.

VIRO DOCTISSIMO

JOHANNI FREIND,
 RICHARDUS MEAD,
 S. D.

FIDEM tandem libero, amicissime vir, & rationem, quam in variolis curandis teneo, una cum exemplis aliquot quæ hanc illustrent simul & confirmant, quæ a me petiisti ut chartis mandarem, ea nunc ad te mitto.

Sermo noster erat, uti memini, de morbo, ubi ad summum incrementum pervenit, & quo modo eo tempore continendus sit æger; dixi me jam ab aliquot annis usu comperisse, commodissimum esse, plerisque saltem in casibus, alvum ducere; nunc, quo consilio, & qua cum cautione id primum fecerim, describam breviter.

Medicos nostros ita plerunque sollicitos habet pustularum consideratio, ut ab omni fere vacuatione periculum esse putent, nimirum ne ab hac materiæ corruptæ concoctio turbetur, aut in partes propulsio prohibeatur.

In faciei & manuum intumescencia spem omnem ponit Sydenhamus; cum tamen mori videamus quotidie, quibus cutis etiam ad summum intumuit, &, ipso fatente, plurimis in casibus nulla arte promoveri possit salutaris ille tumor.

Mortonus, dum in committendis cum veneno morbido spiritibus animalibus totus est, ita calidissimis alexipharmacis, copiis, si Diis placet, contra deleterium hostem auxiliaribus, assidue pugnat, ut novas in sanguine turbas cieat, & accendat quam reprimere debuit febrem; hinc illæ ipsæ, quas adducit, historiæ palam faciunt, plerosque, quorum curam habuit, ægrotos aut excalefactos interiisse, aut saltem *ὡς διὰ πυρὸς* evasisse.

Mihi res hæc sic se habere videtur; in confluentibus regularibus Sydenhamo dictis, cum jam inclinato morbo, detumuit facies, accedit, ex corrupta materia, aut in pus nondum versa, aut ex pustulis in sanguinem rejecta, putrida febris, quæ calore, inquietudine, similibusque indicibus se prodit, & nisi succurratur, intra biduum triduumve plerumque ægrum e medio tollit, interdum vero ad plures dies protrahitur.

Utcunque vero varia jam insint & succedant symptomata, illud tamen omnibus commune est, ut exinanitionem aliquam desiderent. Plerumque fit, ut æger nono aut decimo, a prima pustularum eruptione, die, cum lingua arida, pulsu arteriarum vehementiori, & spiritu difficiliore, incalescat; ubi hæc adsunt, immisso sub vesperam ad ventrem solvendum clystere, postero die leni potione cathartica alvum ducō, vesperi haustum narcoticum, si opus fuerit, sumendum do.

In hoc morbi genere manus & pedes intumescunt: adeo vero non cohibet aut reprimit hunc tumorem purgatio, ut illum post hanc feliciter procedere semper observaverim.

Evenit autem non raro, maxime in pessimæ notæ morbo, ut cum pulsu arteriarum exiguo & languido, sine ulla insigni manuum intumescencia, febricitet ægrotus, & imminutis admodum viribus torpeat magis, quam calore uratur.

In hujusmodi ægritudine, imponenda sunt brachiis & cruribus emplastra vesicatoria; neque tamen ab omni purgatione abstinendum est, sed ea esse debet lenissima & viribus ægrotantis accommodata, & per intervalla repetita; eo enim magis necessaria est, ubi non intumescunt partes, ventris solutio, quoniam in plerisque his casibus, etiam ipsa, quæ in pustulis est, sanies magnam partem in pus non convertitur.

Illud in universum hic tenendum est, majorem jam habendam esse virium ægri, quam pustularum rationem: peracta jam est omnis quæ per cutem fieri potest morbidæ materiæ propulsio; per alias igitur vias ducendus est, qui periculum minatur noxius humor. Cessant ab officio nunc salivæ canales, quique a
primis

primis fere morbi diebus magna copia per hos fluxit, viscidus jam hæret, & vix exspuitur liquor. Urinæ excretio, si forte fuit per aliquot dies larga & benigna, sæpius tamen illa hoc tempore cum difficultate & solito parcius redditur. Restant igitur expurgandæ intestinorum glandulæ, quæ eo sunt corruptis humoribus & sanguine derivandis accommodatiores, quo natura crassiorem lentorem expellunt.

Id vero monuisse debueram, non hoc tantum tempore, sed & nullo non morbi die, ægro protinus mittendum esse sanguinem, si respirandi difficultas urgeat, si supervenerit plurenitis, aut alia quævis nimii fervoris febrilis se prodant indicia.

Ex innumeris exemplis quæ mihi quotidiana experientia sup-
peditat, pauca tantum seligam, ut quomodo hæc medicina ad va-
rios & difficillimos casus accommodetur, ostendam.

Adolescenti annorum fere sedecim, nono ægritudinis die in-
tumuerunt admodum caput & manus, accessit vero febris, cum
magno præcordiorum æstu, spiritu difficili & delirio. Misso
quamprimum e vena brachii ad 3xvj. sanguine, dedi pil. ruff. 3ss.
& elapsis horis decem, cum nondum responderet alvus, elect. le-
nitiv. 5vj. largiter purgatus haustum sumpsit anodynum; hinc
adeo se remisit febris, & levata sunt symptomata, ut, præter spem,
brevis convaluerit, licet in miscellum adeo sævierit morbus, ut,
vitiata a pustulis in utroque oculo tunica cornea, visu privatus vi-
tæ dulcedinem amiserit.

In uno atque altero adolescente eodem fere modo laborante fe-
liciter expertus sum, minime ab hac medicina abstinendum esse,
etiam si (quod non raro fit) crebra in pustularum intervallis exan-
themata erumpant, & malignitatis nomine adstantes terreant;
hæc enim non febrem solvunt, sed materiæ morbidæ copiam &
lentorem indicant; quo magis necessarium est, interposito tem-
pore, alvum sæpius ducere.

In puella quinque annos nata, apparebant inter pustulas a pri-
mis decubitus diebus hic illic maculæ purpureæ & lividæ; manus
vero nono die intumuerunt; die decimo, assumpto electuario le-
nitivo

nitivo mota est alvus; postero die, frons, quam alba quasi vesica obduxerat, livore decolorata est: hanc spiritu vini tepido foveri jussi; singulis noctibus medicamento narcotico conciliatus est somnus; decimo quarto die, nunc primum imminuto manuum tumore, iterum purgata est; ut & die decimo sexto; jamque quæ faciem exasperaverat crusta nigra dehiscere cœpit, & tarde licet dirupta certam tamen spem salutis ostendere.

Accidit interdum, sed raro, ut sub finem ægritudinis repullulet quasi morbus, & succedentibus sub crustis, quibus obducta est cutis, novis pustulis, renascatur; unde pro humoris abundantia etiam ultra vicesimum diem porrigitur malum; illud nuper vidi in nobili fœmina annorum quadraginta, quæ opimo corporis habitu, etiam tertium succrescentibus variolis materiam suffecit; facta hinc est per omnia membra continuata exulceratio, ad diem usque vicesimum & octavum se excipientibus crustulis, ita ut ex longo decubitu ulcera in lumbis gangrænæ metum attulerint. Die duodecimo, leni potione purgata est; decimo quinto, subfidente qui ad hunc diem duraverat, manuum tumore, iterum alvum subducere necesse habui; &, interjectis tribus vel quatuor diebus, purgationem repetiit ad usque morbi exitum; restituto tandem in integrum, post longam valetudinem, ulcerato corpore.

Omnem de purgatione dubitationem tollit nonnunquam in gravissimis casibus ipsa natura, dum in inferiora noxiam materiam depellit, continuato per plures dies alvi fluxu; hoc cum sit, ita nunc comprimi nunc solvi debet venter, ut ne nimix dejectiones vires prosternant. Incolumis hoc modo evasit nuper admodum nobilissimus adolescens, annorum 18. Huic facies sexto die, sine ullo tumore, chartæ pergamenæ speciem referebat; suppurationis signa nulla erant; quapropter imposita sunt membris emplastra vesicatoria, quæ solito plus humoris educere observavi. Die nono, manibus nihil prorsus intumescens, supervenit diarrhæa; hanc sumptum sæpius cum confectioe fracaistorii rhabarbarum ita compescuit, ut ter tamen quaterve quotidie minimum de-
jiceret æger; decimo quarto die, rupta in facie membrana tenui
fanie

sanie erosa subtus apparebat cutis, non ante vicesimum diem deciditibus penitus squamulis; alvus vero, per omne id tempus, eo quo dixi modo, fluebat.

Et sane, ut finem tandem faciam, vix quenquam graviter hoc morbo correptum salvum fieri vidi, nisi cui, declinante febre, aut largiter profluens urina, aut resolutus venter, salutis fuit. Ut de infantibus nihil dicam, quos per totum morbum cita alvus periculo plerunque liberat.

Hæc habui, vir eruditissime, quæ tecum super hac re communicarem; tu illis sic utaris velim, ut dum nostras has rationes acri tuo judicio perpendis, quantum momentum eæ habere possint etiam in aliis interdum febribus, quæ difficulter & tarde solvuntur, dispicias. Mihi certe ita feliciter cessit hæc medendi via, ut humani generis interesse putem, ut illa publici juris fiat. Sed de hoc tu statues, ut voles; ego fatis superque habeo tibi morem gessisse, & quanti tua mandata faciam hoc officio comprobasse. Vale, & me tui amantissimum, quod facis, ama.

Dabam Calend. Septemb. 1716.

AN ABSTRACT of part of a letter from Dr. Bonomo to Signior Redi, containing some OBSERVATIONS concerning the WORMS of HUMAN BODIES.

HAVING frequently observed that the poor women when their children are troubled with the itch, do with the point of a pin pull out of the scabby skin little bladders of water, and crack them like fleas upon their nails; and that the scabby slaves in the bagnio at Leghorn do often practise this mutual kindness upon one another; it came into my mind to examine what these bladders might really be.

I quickly found an itchy person, and asking him where he felt the greatest and most acute itching, he pointed to a great many little pustules not yet scabbed over, of which picking out one with a very fine needle, and squeezing from it a thin water, I took out a very small white globule scarcely discernible: observing this with a microscope, I found it to be a very minute living creature, in shape resembling a tortoise, of whitish colour, a little dark upon the back, with some thin and long hairs, of nimble motion, with six feet, a sharp head, with two little horns at the end of the snout.

Not satisfied with the first discovery, I repeated the search in several itchy persons, of different age, complexion and sex, and at differing seasons of the year, and in all found the same animals; and that in most of the watery pustules, for now and then in some few, I could not see any.

And though by reason of their minuteness, and colour the same with the skin, 'tis hard to discern these creatures upon the surface of the body, nevertheless I have sometimes seen them upon the joints of the fingers in the little furrows of the cuticula, where with their sharp head they first begin to enter, and by this gnawing and working in with their body, they cause a most troublesome itching, till they are got quite under the cuticula; and then 'tis easy to see how they make ways from place to place by their biting and eating, one single one happening sometimes to make several pustules, of which I have often found two or three together, and for the most part very near to one another.

With great earnestness I examined whether or no these animalcules laid eggs, and after many enquiries, at last by good fortune while I was drawing the figure of one of them by a microscope, from the hinder part I saw drop a very small and scarcely visible white egg, almost transparent, and oblong, like to the seed of a pine-apple.

I oftentimes found these eggs afterwards, from which no doubt these creatures are generated, as all others are, that is, from
a male

a male and female, though I have not yet been able by any difference of figure to distinguish the sex of these animals.

From this discovery it may be no difficult matter to give a more rational account of the itch, than authors have hitherto delivered us. It being very probable that this contagious disease owes its origin neither to the melancholy humour of Galen, nor the corrosive acid of Sylvius, nor the particular ferment of Van Helmont, nor the irritating salts in the serum or lymph of the moderns, but is no other than the continual biting of these animalcules in the skin, by means of which some portion of the serum ouzing out through the small apertures of the cutis, little watery bladders are made, within which the insects continuing to gnaw, the infected are forced to scratch, and by scratching increase the mischief, and thus renew the troublesome work, breaking not only the little pustules, but the skin too, and some little blood-vessels, and so making scabs, crusty sores, and such like filthy symptoms.

From hence we come to understand how the itch proves to be a distemper so very catching; since these creatures by simple contact can easily pass from one body to another, their motion being wonderfully swift, and they as well crawling upon the surface of the body as under the cuticula, being very apt to stick to every thing that touches them, and a very few of them being once lodged, they multiply apace by the eggs which they lay.

Neither is it any wonder if this infection be propagated by the means of sheets, towels, handkerchiefs, gloves, &c. used by itchy persons; it being easy enough for some of these creepers to be lodged in such things as those; and indeed I have observed that they will live out of the body two or three days.

Nor in the last place shall we be at a loss to know the reason of the cure of this malady by lixivial washes, bathes, and ointments made up with salts, sulphurs, vitriols, mercury's simple, precipitate or sublimate, and such sort of corrosive and penetrating medicines. These being infallibly powerful to kill the vermin lodged

in the cavities of skin; which scratching will never do, partly by reason of their hardness, and partly because they are so minute as scarcely to be found by the nails.

Neither do inward medicines perform any real service in this case, it being always necessary after a tedious use of these to have recourse to those external ones already mentioned. And if in practice we oftentimes experience, that this disease, when we think it is quite cured by unction, does nevertheless in a short time return again, this is not strange, since though the ointment may have killed all the living creatures, yet it may not probably have destroyed all their eggs, laid as it were in the nests of the skin, from which they may afterwards breed again and renew the distemper. And upon this account, 'tis very advisable after the cure is once performed, still to continue the anointing for a day or two more; which it is the easier to do, because these liniments may be made agreeable enough, and of a good smell, as particularly is that compounded of the ointment of orange flowers or roses, and a small quantity of red precipitate.

AN ACCOUNT of three cases of the HYDROPHOBIA.

THE symptoms from the bite of a mad dog are so surprising and terrible, that it is hardly possible to describe the agony of a patient in this unhappy condition. I have lately had the opportunity to see two instances of this case.

The first was of a lad of about the age of nine years, a sturdy and bold boy. A mad bitch of the mungrel kind was hunted in the street, he struck at her with a stick, and she flying in his face, bit him in the right cheek, which was torn with a large wound to the middle of the nose. This was on the 20th of April last. 1709. A surgeon cured the wound in about 14 days time, by applying for the first three days, theriac. andromach. in sp. vin. and

and afterwards dressing it with liniment. arcaei and balsam. terebinthin. No other care was taken, only a bolus of theriac. antidromach. was given him every night while under cure, and quickly after he was bit, he was persuaded to eat the whole liver of the bitch fried.

He continued very brisk and well to the 22d of May; upon that day he seemed dull and sick, would eat no dinner, except a little boiled spinnage, walked out in the afternoon, and in the evening complained of his stomach and head; his mother gave him a small glass of brandy, for he would drink nothing else. In the night he was very bad, startled often, and screamed out as in an agony, especially when desired to drink, and complained miserably whenever he made urine, saying it hurt him. The next morning he vomited up the herbs he had eat the day before, unaltered. I was sent for that day in the afternoon, and found him in a perfect agony, all in a sweat, trembling, tossing himself up and down, talking continually, looking very wild; his pulse low, and sometimes quicker, then slower: his urine made the night before as well coloured as ordinary. I desired him to drink; he took a little in his mouth, but as it was going down, he threw it out with violence, saying it hurt him; and praying that he might take no more. We over persuaded him to hold a little in his mouth and swallow it by degrees and gently; he did so with a little more ease, but was glad when it was over. We bid him suck the drink through a quill; he tried, but could not get it down by continual gulps, but stopped as soon as a very little was passed, still crying out that it hurt him to swallow it.

I presently declared the case to be desperate. However for the satisfaction of the relations, blistering plaisters were applied to the back and on each side of the neck; and a diuretic bolus of sal. succin. camphor. and conserv. lujul. was given every six hours; for he seemed from the first of his complaint to have a difficulty of urine.

The next day, the 24th at noon, I found him much worse, he had raved all night; could not bear the sight of any thing

white, and said, that if all the women in the room who had white aprons would go out, he should be well presently. He said he would drink if we would give him it in a black cup; but when brought made many excuses and could not, though at the same time complained he was dry, and pleased himself with talking of full pots. He eat some bread and butter heartily, but vomited it up quickly together with a frothy slime. We dipped him in a tub of warm water; he said he was not afraid of water, and was quiet in it for a little while, but soon fell into a convulsion fit, which obliged us to take him out. I observed his eyes to grow more staring, and the pupil to be prodigiously enlarged. He was thrown continually with such violence from place to place, that it was very hard to keep him in bed; and quite tired and spent, fell into cold sweats, and died this day at four in the afternoon.

The next day I obtained leave to open the body. We examined the brain, throat, breast and stomach, but met with no extraordinary appearance any where, excepting that there was a great quantity of greenish viscid bile in the stomach.

The other patient was a very lusty vigorous man of 45 years. He had ten weeks before been bit in one of the fore-fingers near the nail, by a little naked dog of the Guinea breed. On the 8th of November in the morning he complained of a great sickness at stomach, and vomited green and yellow choler. The next morning he took a dose of rad. ipecacuanh. Whilst he was vomiting, he complained of a difficulty of swallowing; and when pressed to drink to work off the medicine, contrived himself a way of sucking the gruel given him, through a piece of a tobacco pipe, but could not get down above one pint; and though he afterwards often tried this trick, yet it did not succeed.

On the 10th he had eight ounces of blood taken away at the arm, and took a bolus of theriac. andromach. with lap. contrayerv.

I came to him on the 11th; found him tied in his bed, raving mad, biting and spitting at the by-standers, crying out murder, making an odd noise as if he coughed up something from the throat;

throat; this motion I had also took notice of in the boy, and I suppose this is what some authors have called barking.

He said he would drink if we would unbind him, and give him water; but as soon as it came to his mouth, he threw away the cup with the greatest fury imaginable, and grew so unruly, that he was with much ado tied down again.

I observed that he had a palsy of his right arm, for he moved this only by the help of the other; and those who attended him, had taken notice that this symptom began the day before, and that at the same time he had endeavoured to read, but could not, complaining of a mist before his eyes.

As he seemed afraid of every body, so he shewed the greatest enmity to those, for whom at other times he used to have the most love and respect.

I ordered a surgeon to take away 20 ounces of blood at his arm: and observed it to be very thick and black. He was very tame after this for a few minutes, but fell again into his outrageous fit, in which he soon laid himself down quite spent, and died.

I could not by all possible means get leave to open the body.

Since these accidents I have had an account sent me by a surgeon from Stamford in Lincolnshire, of a young man of about 18 years, who died hydrophobus by the bite of a mad fox, that had been bit by a mad dog. The symptoms discovered themselves three months after the wound, which was upon the back of the hand, and being healed by the application of theriaca andromach. had left a small black scab behind.

Three days before his death he was seized with a fever, for which he was blooded, vomited and blistered; he bit to pieces the glass in which drink was given him. When dissected, the fauces were found very much inflamed; the left lobe of the lungs black, with the vesicles full of black blood; the surface in some places, which the blackness had not covered, appearing blistered, as if raised by cantharides. The liver was hard and of a yellow bilious colour.

During

During the whole violence of the distemper, the penis was observed to be continually erected, and as hard as a bone. This symptom is particularly taken notice of by Cælius Aurelianus.

The surgeon who opened the body, with his knife slightly wounded his fore-finger, and was surprized to find that it festered, and gave him much more pain than a greater cut had at other times done. This I the rather take notice of, because something of the same nature happened to the surgeon who dissected my patient. His hand the following night was taken with an erysipelas, attended with great tension and pain: this was owing to a little wound made in one of his fingers a day or two before, from which, in turning over the parts, he had rubbed off the plaister; and it went not off without the continued application of cooling and discutient medicines.

From all these histories, it may not perhaps be wrong to conclude, that the ^a Hydrophobia, (a name not very proper for the distemper) is the effect of a particular kind of an inflammation in the blood, accompanied with so great a tension and dryness of the nervous membranes, and such an elasticity and force of the fluid with which they are filled, that the most common representations are made to the mind with too great effect, and the usual impressions of objects upon the organs cannot be suffered: hence proceed the timorousness, unaccountable anxiety and inquietude, which are always the forerunners of the dread of liquids; as also did the pain in making water, and the strange aversion observed in the boy at the sight of any thing white; the retina being really hurt and grieved by the striking of the rays of light upon it. Nor is it hard to conceive that when the salival liquor is hot, and the throat inflamed and dry, the swallowing of drink should cause such an intolerable agony; no more than it is that, when things are wrought up to this wretched condition, the dismal tragedy should not last above three or four days at most, in which the patient is perfectly fatigued and torn to death by the violence of his actions and efforts.

^a Vid. Essays on Poisons.

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A.

AARON, a native of Alexandria, who practised as a physician about the year 622, was probably the first writer that noticed the small-pox and measles, p. 308. and from him Rhazes seems to have derived his knowledge of those distempers, *ibid.*

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290. l. 19, 20, *for* goods a power, *read* goods have a power.
304. l. 22. *for* Latin, *read* English.
325. l. 28. *for* warty, *read* watery.
327. l. 3. *for* warty, *read* watery.
425. l. 14. *for* will be, *read* will not be.
622. note, l. antepenult. *for* Plutum, *read* Plautum.



